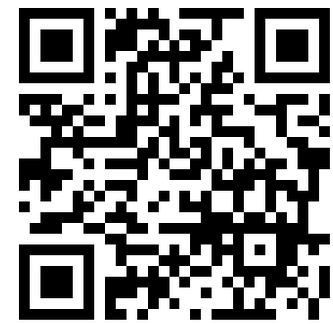
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JOURNAL OF THE TELEGRAPH.

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ELECTRICITY AND THE RAILROADS.

The grand Central Depot at Forty-second Street, New York, was opened to business on Wednesday, November 15. The opening was signalized by the test, in the hands of Mr. Toucey, Superintendent of the Hudson River Road, of a system of electric signals devised by him, by which one man will control the movements of all locomotives and trains in the vicinity of the depots.

A signal room is at the centre of the north wall. A large number of electric keys are arranged on a table, connecting with gong bells and disks in the depot, and in a round building 100 feet north. The disk signals within the depot are displayed from three round cases over the door-ways of the north wall, beneath which hang the bells. There are bells also in the passenger and baggage-rooms, rung by the electric apparatus. Twenty minutes before a train is to leave, two taps of a bell instruct the door-keeper of the passenger-room of the road to which that train belongs, that it is time to allow passengers to enter the cars. Five minutes before the time of departure, three taps on the bells give warning. One tap at the exact time for leaving, is a signal to close the doors. Nine of the keys on the table are used for signaling the interior operations of the depot—three for each road.

The signal-house outside the depot, is a curious building, displaying on its north and south sides, sixteen glass bull's-eyes, each a foot in diameter. The bottom row contains six windows, the second six, the third three, and a single bull's-eye is over all. The twelve lower windows are for the instruction of the switchmen. When a train is signaled from the junction, the signal-man at the depot, touches a key on his board that causes a number to appear in one of the bull's eyes, and at the same time rings a gong hanging on the signal-house. The number indicates the switch to be prepared for the incoming train. The three bull's-eyes in the third row are colored disks. When one turns up at the same time that the gong rings, the engineers of that "color" know that one of their engines is wanted. Three strokes upon a certain gong, one minute before the time of departure, instruct the engineer to back into the depot and fasten upon the train. Besides the keys mentioned, there are several others on the board. Two are to indicate whether trains are to be stopped at Fifty-sixth street or not, and two are to inform engineers whether they shall unhitch their engines from incoming trains, or draw them into the depot.

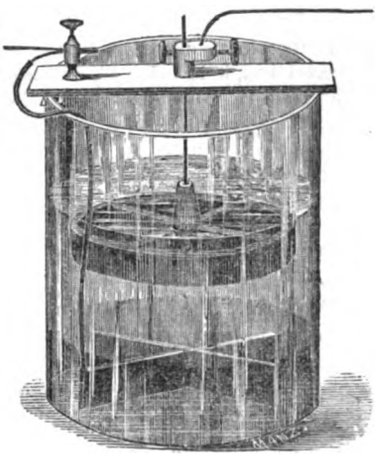
A device has also been adopted by which every train, as it passes out at the upper end of the Yorkville tunnel, touches a spring and sends back an electric current, ringing a bell in the signal-tower, informing the operator that the way through the dark passage is all clear. Coming into the city, from the junction at Mott Haven, every train regulates the signals to be observed by the following trains.

The electric block signals on the Harlem road divide that time in sections of one mile each, and not more than one train will be allowed in a section at the same time. The engineer running the last train, can always tell if the forward train is less than a mile in advance of him, and if he finds that such is the case, he is obliged to stop until the signal shows him that the train has passed the next mile-post.

THE CALLAUD BATTERY.

The Callaud battery is composed of a zinc plate in a solution of sulphate of zinc, and a copper plate in a solution of sulphate of copper. By the chemical action there is a constant increase in this amount of sulphate of zinc in solution, and a constant deposit of pure copper. The zinc and the sulphate of copper are consumed.

So far, therefore, as the metals and solutions are concerned, the Callaud battery is identical with the Daniell. The difference between the two consists in the arrangement of the various parts, so as to insure in the former greater constancy with less expense for labor and material than in the latter.



In Callaud's battery, the porous cup is dispensed with, and the solution of sulphate of copper, being heavier than that of sulphate of sinc, remains in the bottom of the jar. In this the copper plate is placed, resting on the bottom of the jar, while the zinc is suspended about 4 inches higher in the solution of sulphate of zinc. Mr. Callaud has made his zincs and coppers in various shapes, but the best results are attained by the arrangement shown in the accompanying diagram. The zinc is a wheel with spokes radiating from the centre with a projection upward from the centre terminating in a wire from which the zinc is suspended at the proper height in the jar. The copper is in the shape of a cross or a star, from which an insulated wire is brought up through the liquid to the next binding post.

Lumps of sulphate of copper are dropped into the jar from time to time, which fall through the zinc to the bottom of the jar. Enough should be supplied to keep the blue color as high as the top of the copper. But the color should never reach as high as the zinc.

The separation of the two solutions as above described, by their difference in specific gravity, is much more perfect than by a porous cup. Local action is thus prevented, and all the material consumed is utilized.

The Daniell battery is itself among the most economical batteries ever used, yet experience on a large scale shows a considerable saving in material by using the Callaud, from the fact that local action is prevented. This saving is particularly manifest in cases where the current is open a part of the time.

But the saving of material variously estimated at 25 to 50 per cent is unimportant compared with that of labor in maintenance, and compared with the advantage of an even constant current.

This longer duration or greater constancy on account of the avoidance of local action, and in consequence of the greater quantity of water for the sulphate of zinc solution, requiring a longer time to become saturated.

Instances are frequent where a local battery has lasted eight to twelve months, until the zinc was entirely consumed, without being taken down, the labor of maintenance being the dropping in of sulphate of copper as before mentioned, and the drawing out of the sulphate of zinc solution and replacing with clear water.

The Callaud Battery is furnished in two sizes, the jars being eight inches high, and respectively five and six inches in diameter. The larger size is used for both main and locals, the smaller for mains exclusively. The resistance of each of the larger sized cells is about two and a half to three and a half ohms. That of the smaller size is from three to five ohms. The electro-motive force is equal to the Daniell and about three-fifths of that of the Grove cup, when they are first set up. That of the Grove or Daniell declines more rapidly than the Callaud.

In another article we will give statistics showing the results of various experience with the Callaud Battery in actual use.

By a dispatch to Mr. Field, dated November 22d, we learn that Australia is now connected with the great Indian lines of communication, by the successful laying of a first-class cable, by the Cable Maintenance Co., of London, between Batavia, on the southern extremity of the island of Sumatra, Southern China, and Port Darwin, Australia. This gives communication, of course, with Melbourne, and the whole line of internal telegraphs on the island, as well as with Hobartown, Tasmania, and to New Zealand. There remains thereafter one grand work to accomplish. A cable from the Australian coast to the Sandwich Islands, by way of New Caledonia and the Fejee Islands, 4,560 miles, and another, of 2,093 miles, from Honolulu to San Francisco, will complete the circle of the globe. American interests, so largely affected by the means of communication, will, at no distant day, demand their being laid.

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GOVERNMENT AID TO SCIENCE.

When we look over the long list of benefits which science has conferred on many departments of human industry, and remember that by just so much as these have been bettered has the condition of the people been improved, there no longer remains a question as to the duty of governments toward the cause of science and its promoters. If its paramount object be the welfare of the citizen, and the general diffusion of scientific knowledge, and a liberal encouragement of scientific research will largely add to this, it certainly comes within the province of the Government to see that these are secured. Scientific men as a rule are poor; the practical results of their work are oftentimes remote, and even if immediate are rarely secured by those most entitled to them. Thus it frequently happens that while ready and anxious to give their energies to the advancement of science, they are hindered in their work by pecuniary embarrassment, and are not rarely forced to abandon a field which by their tastes and knowledge they are eminently fitted to cultivate. The services of these working men of science can ill be spared, for in the direction they would take us lies the modern road to national advancement. Germany long ago saw this, and set to work in the right direction. We are told by Sir William Thomson in his recent address before the British Association that in Prussia every university, every polytechnical academy, every industrial school, most of the grammar schools, in a word nearly all the schools superior in rank to the elementary school of the common people, are supplied with chemical laboratories, and a collection of philosophical instruments and apparatus, access to which is most liberally granted by the directors of those schools or the teachers of the respective disciplines to any person qualified for scientific experiments. In consequence there will scarcely be found a town of five thousand inhabitants but offers the possibility of scientific explorations at no other cost than reimbursement of the expense for the materials wasted in the experiments. Professors, preceptors, and teachers of secondary schools are engaged on account of their skillfulness in teaching; but professors of universities are never engaged unless they have already proved by their own investigations that they are to be relied upon for the advancement of science. Therefore every shilling spent for instruction in universities is at the same time profitable to the advancement of science.

This is the relation which Germany takes to science and scientific men; and the position of that country to-day, not only as the greatest military power on earth, but what is a far higher title, "the foremost in science of all the nations," attests the wisdom of the measures which her rulers were the first to inaugurate. England is also rapidly waking up to the importance of the question, and, in spite of the bigoted opposition of the universities and the clergy, has already made great headway in the cause of scientific education; and now her scientific men are demanding of the Government such a liberal cooperation in their work as shall relieve it of the uncertainties of private enterprise, and give it an impulse in some degree commensurate with its importance.—*Galaxy.*

We regret that in the last issue of the JOURNAL our remarks relative to the death of Christopher Reynolds led to wrong impressions, and were not strictly correct. We are happy to state that his last days were spent in comfort, with every want supplied, and surrounded by those most dear to him. The knowledge of this will be a happy relief to his many friends.

A SINGULAR WELL.

The frozen well at Brandon, Vt., has recently been the subject of a report by a Committee of the Boston Society of Natural History. Twelve years ago attention was directed toward this curious well, which remains frozen throughout the Summer months, and a committee was appointed, which continued each year for six years, to visit and examine the well and the surrounding country. A report was then made and published, but, in consequence of the predictions of an eminent man of science, that the ice would soon cease to form in the Brandon well, it became necessary to wait a few years to collect further facts. The committee now reports that for twelve years the ice has remained in the Brandon well, during the hot months of Summer, notwithstanding openings were made in the soil, and a tunnel was run into the gravel bed to give more free access to the warm surface water.

It has been suggested that the water dissolved something from the rocks that makes a freezing mixture, but a chemical analysis shows that one wine gallon of this fluid contains 25.2 grains of solid matter, resolvable into 6.8 grains of vegetable matter, and 18.4 grains of mineral salts. Of the solid matter 2.8 grains were found to be composed of bi-carbonate of lime, magnesia and iron, and sulphate of soda, with traces of chloride of calcium and sodium. There is, therefore, nothing in the composition of the water which will explain the freezing. Other persons, arguing from the theory that electricity produces hail, have assigned the action of the same influence as the cause of the frozen well.

Repeated tests with the magnetic needle failed to disclose any difference in local variation, thus showing that no perceptible electric current was passing through the well or surrounding soil. The original explanation is, therefore, adhered to by the committee. The gravel bed, it is believed, was frozen by the cold of previous rigorous Winters, and the wave of Summer heat has not yet been able to overcome that cold. Brandon is situated in Rutland county, Vermont, and has the same latitude as the Northern part of Lake George.—*Roch. Express.*

THE GLOBE ENGIRDLED.

In the history of applied science there is nothing more marvellous than the development of Telegraphy. Whether it be by overhead or subterranean land lines, or by submarine cables; whether we regard the manufacture of the conducting wires or the invention of instruments for transmitting and recording messages; it is surprising to reflect upon the giant strides that have been taken since the first submarine cable was laid across the English Channel, some twenty or five-and-twenty years ago.

It is within a generation that Telegraphy has risen into note as a special science and profession, and at last received due recognition by the establishment of a Society of Telegraph Engineers.

At the present moment, all that is needed actually to complete a "girdle round the globe," such as Shakespeare only dreamt of, is the connection of the American Pacific Coast and the Islands of Japan; which link in the circumterranean commuuication is now in contemplation. Mr. Cyrus Field has projected a line from Victoria, the capital of Vancouver's Island, to Hakodadi, in Japan, and from thence to the Russian naval station on the coast of Asia, whence, across the steppes of Siberia, the telegraphic wire penetrates to St. Petersburg, and is united with the European system. This new line, the estimated length of which is 4,370 nautical miles, will touch at Atcha, one of the Alcutian Islands. A second route projected is identical with the first, as far as Atcha; it pursues a more southerly course to Yokohama—a distance from the United States of 4,235 miles. From Yokohama it describes a segment of a circle to Shanghai—a further distance of 1,010 miles. A branch crosses the Island of Niphon and the Japan Sea, and joins the Russian lines at Possiette. A third and last route starts from San Francisco, traverses the North Pacific to Honolulu, in the Sandwich Islands, connects this group with Midway Island, and thence to Yokohama—a total distance of 5,573 miles. Making an allowance of 20 per cent. for slack, the length of cable required for the first route is 5,244 miles; for the second, 5,244; for the third, 8,463. Each line is supposed to terminate at Possiette, which is 1,480 miles from Yokohama. It is in contemplation to lay a Cable between Honolulu and the Australian Colonies, thereby establishing direct intercourse between Melbourne and San Francisco. This line is thus divided: San Francisco to Honolulu, 2,093 nautical miles; Honolulu to Fiji Islands, 2,950; Fiji to New Caledonia, 810; New Caledonia to Brisbane, 800—6,653; add 20 per cent. for slack, 1,331; length of cable, 7,984 nautical miles. Brisbane is already connected by land lines with Sydney, Melbourne and Adelaide; also with Port Darwin on the north coast. The Dutch colony is now in direct relation with the India and Chinese cables.—*Mechanics' Magazine.*

TURNING A GALVANIC BATTERY INTO A DETECTIVE.

Many years ago Major Stone, of the Fifteenth British Huzzars, then stationed in India, had a gold watch and chain stolen from his drawing-room table. Collecting all of the native servants of whom he had any suspicion, together, and made them join hands, he told them that presently his God would give them a shock, which, however, would be harmless to all but the culprit; but that, if he was among them, he would, in an hour, turn green and silently die. The black fellows grinned incredulously, when the wires of a very powerful battery, prepared and concealed under the table, were brought in contact with the two end men. So severe was the shock that three of them fell to the ground. The Major then remarked that if the guilty one came to him within a half hour he would give him an antidote that would save his life. The effect of the shock upon the imagination of the superstitious thief was so great as to induce belief in the prospect of turning green and dying, and he shortly came, watch and chain in hand, to beg for mercy and the antidote.

Recently, a similar attempt by a policeman in India, to bring a woman to confessional, was not so satisfactory. The woman died through fright, and the policeman was brought to answer a charge of homicide.—*Roch. Express.*

THE LINE TO MEXICO.

BROWNSVILLE, TEXAS, Nov. 16, 1871.

James D. Reid, New York:

I congratulate you on the conclusion of the line to connect with Mexico. JACOB CAMPBELL.

We believe the public is greatly indebted for the enterprise shown by Mexico to the energy and perseverance and excellent character of our old friend Campbell. He has, practically, the whole work of Mexican telegraph extensions in his hands, and he never yet abused a trust.

We have also the following:

LOUISVILLE, KY., Nov. 15.

Hon. William Orton:

Line completed to Brownsville, Texas, yesterday. Mexican lines are working as far as Mier. The only interruption beyond that point is caused by the revolutionists.

J. VAN HORNE, Gen. Supt.

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PROGRESS OF RAILROADS.

A company has been formed in St. Louis, with a capital of $2,000,000, A. L. Green, President, with a directory largely in Chicago and New York, the chief purpose of which is to construct two railroads—one from St. Louis to Arkansas River, 400 miles long; the other from Centralia, Ill., to Wichita, Kansas, 500 miles long.

The Burlington, Cedar Rapids & Minnesota Railroad is completed to Nova Springs, Iowa.

The Davenport & St. Paul Railroad is completed to Wyoming, Iowa, and will be in operation to Monticello, about 75 miles northwest of Davenport, during the month.

The Sioux City & St. Paul Railroad is now complete to Worthington, Minn., 60 miles southwest of St. James.

The Decatur, Sullivan & Mattoon Railroad is nearly complete.

The Baltimore & Ohio Railroad Co. has projected a new route from Pittsburgh to Chicago.

A railroad is projected from McCarmillsville, Muskingum River, 70 miles, to Dennison, on the Panhandle line.

The Detroit, Lansing & Lake Michigan Railroad is in operation to Howard City, on the Grand Rapids Indiana Railroad.

Work has been commenced on the Griffin & Madison (Ga.) Railroad.

The Lafayette, Bloomington & Mississippi Railroad is fast approaching completion.

The Kentucky Railroad, connecting Elizabethtown and Paducah, has been completed 110 miles, and will be opened throughout in July, 1872.

The Denver & Rio Grande Railroad will be completed March 1, 1872, from Colorado Springs to Arkansas River.

A telegraph line has been completed along the Northern Pacific Railroad from Duluth to the Cheyenne crossing, 60 miles west of Moorhead, and from Moorhead to Pembina. It is now also complete to Fort Garry.

The Chicago, Dubuque & Minnesota Railroad is now completed to McGregor.

Toledo is the focus of fifteen railroads. There are now in progress to that city, the following :

Lake Shore road to Elyria, O.	84 miles
Toledo to Mansfield, via Tiffin, O.	88 "
To Pomeroy, Ohio River, connecting with the Chesapeake and Ohio R. R. to Norfolk	225 "
To Holly, to connect with Saginaw line	90 "

These will be opened within a short period.

PROJECTED AND PROBABLE EXTENSIONS.

Toledo direct to Ann Arbor and Owosso, Mich.	135 miles
Toledo and St. Louis Air Line, via Kokomo,	420 "
West Branch Chic. and Canada Southern R. R.	30 "
East Branch Chic. and Canada Southern R. R.	40 "

The photo plate of the Morse Memorial Monograph, as now produced, is a most perfect and beautiful work. The likeness of Prof. Morse in the centre is now executed separately, is fine and clear, and exhibits him with all the medals presented to him by the European governments. The whole measures 12x14, and seems exceedingly cheap. Price $1.25, mailed, post-paid, on rollers. Orders sent to us will reach the publishers, and be promptly filled.

A SINGULAR INQUIRY.

OIL REGIONS, Pa., Nov. 10, 1871.

Editor Journal of the Telegraph :

I have an odd little fellow for Messenger Boy. In this unsettled region of Oil Derricks and territory, scattered over for miles with oil producing interests, it is often very hard work to find parties to whom messages are addressed. A few days ago, we received a message for a certain party ; after looking and inquiring in vain for him, the little fellow astonished me by asking, "If the party whom we were searching for was a Christian." I inquired of him his reason for asking so singular a question. He replied, because he would know better where to look for him. The boy is obliged to go into all sorts of company, at times, to find parties addressed—hence his singular inquiry.

Should you mention this in the papers, you need not give date or place of occurrence, nor my right signature. VICTOR.

OIL CITY, Nov. 13, 1871.

Editor Journal of the Telegraph :

DEAR SIR :—We are using, quite extensively, the Callaud local. Will you be so good as to print in your next issue the proper mode of treatment for them. Please cover the ground fully, so that we may enjoy all its advantages, and avoid the disadvantage of insufficient information. Respectfully.

* * *

OCEAN TELEGRAPHY.

The binding link between all the great questions of taxation, industry and commerce, as well as their adjunct, a sound currency, is ocean telegraphy. Without the telegraph all financial schemes would come to naught. Without ocean cables there can be no revival of American shipping. As it is beginning to be generally felt that the Pacific is to be the great highway of American commerce, and the nations of the East the chief commercial allies of the American people, there are even now three bills before Congress asking for subsidies for submarine cables, to Japan, China, the Sandwich islands, and Australia. These and the subsidies asked for by the proposed American steamship companies, as well as the additional land grants demanded by infantile aud impecunious railroads, are likely to revive the question of giving away money or land for the purpose of promoting the means of land and water communication. The question has two sides, and both will be pretty thoroughly ventilated this winter.—*Herald.*

We learn from a correspondent on the line of one of the Missouri Railroads, that, owing to the frequent intersection of the roads, and the clubbing of offices, communications left for transmission have become almost like public property. So much so is this the case that even the Railroad officials hesitate about leaving confidential dispatches of importance, lest they be read by eyes for whom they are not intended.

Every arrangement which trenches on the sacredness of dispatches should be vigorously opposed. The absence of the means of confidentiality soon impairs the sense of the necessity of their confidential care. The contents of messages thus become a theme of common gossip, and although given in a semi-sacred whisper is none the less endowed with wings and becomes a secret which every body knows. We caution all against this looseness in arranging "joint offices," and trust that the incipient evil may be checked before much further mischief is done. An operator allowing the contents of a message to become known *should* be dismissed without appeal.

ENGRAVING WITH THE SAND BLAST.

The most remarkable invention brought out within the past year is that by Mr. B. C. Tilghman, of Philadelphia, for engraving on glass and stone. By means of a jet of quartz sand, blown through a pipe by steam at a pressure of 300 pounds to the square inch, he can cut a hole in a solid block of corundum—only inferior to the diamond in hardness—in a few minutes. The new process is now exciting great interest in Europe; an English journal thus speaks of it: "This American engineer just turns upon corundum a pipe which discharges sifted sand, mixed with a furious squirting of steam, and the fine shower of particles thus flung cuts a hole equal to the diameter of the jet. The same effect is produced in anything else submitted to the process. Here has the world been grinding, hammering, chiseling, and whirling drills for centuries, to make holes and channels in obdurate substances, when suddenly the friend of our youth, the squirt—in a new form, no doubt—comes to the rescue; and for the future we shall see the work done by this irresistible jet of dust beating in ten million millions of fairy raps upon the object; thus effecting what is wished in a tenth of the previous time, and with exquisite precision. It may be added that the latest adaptation of this new invention is to a peculiar process of replacing the art of wood engraving. It consists in bringing upon a suitable matrix a photographic copy of the drawing or engraving to be reproduced. This is then passed beneath the sand-blast, and the cutting is thus obtained. The reverse engraving is then subjected to the electrotype process, and any desired number of copies are produced."

We have declined few manuscripts sent to us, and these have been chiefly of the poetic character. Writing poetry is a poor business to most people, and making poetry out of signals is desperate. One or two good specimens we published, but these brought down upon us such an avalanche of "call" angels that we had to shut the door.

We must decline "Sorrow's Complaint," by a "retchid plug." We don't see the sorrow, and cannot feel the force of the refrain.

We must also decline the "Lectures by A Fool, No. 1." The subject is not within the liberties of our columns, although written by an intelligent and excellent manager.

A GENTLEMAN of a slightly irritable temper, calling out loudly for some hot water from his bed-room, was unanswered. Seizing a small bureau, he shoved it before him to the head of the stairs, and sent it whirling, end over end, to the hall below. The crash was loud enough to bring out mother, daughter, and all the servants. The head of the family was seated at the head of the stairs, elbows on knees, chin resting in hands.

"Oh, father! what is the matter?" asked the frightened daughter.

"Matter!" said the old man; "why, here I have been a callin' and callin' for very nigh on half an hour, and now I've *telegraphed* for yer, that's all."

THE Swiss Federal Council has sanctioned the International Telegraph Convention, recently concluded, relative to the increase of the telegraph charges on all the Anglo-Indian lines to £4 10s. per 20 words.

TRINIDAD advices state that the telegraphic cable to Georgetown, Demerara, has been laid, but communication is not open, as about 100 yards of land line require to be put upon the south coast to complete the connection, and this, for some unexplained reason, has not been done, though the shore end of the cable was landed several days ago.

THE latest news from Australia states that everything connected with the Overland Telegraph was making satisfactory progress.

Mr. Arthur Cole has resigned his position as Supt. of Telegraph on the Kansas City, St. Joseph & Council Bluffs Railroad, on account of his health, which was rapidly failing. He has gone South, by advice of his physician, and is now in Mississippi.

Mr. J. McConniff succeeds Mr. Cole as superintendent of the above-mentioned railroad lines.

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ANSWERS TO CORRESPONDENTS.

Here is a point in reference to checking business which does not seem to be provided for in our present system, whereof we require instructions. It is as follows:

Somerset, Pa., sends a message to Baxter, checked 14 paid. Baxter, unable to find the party addressed, notifies Somerset and is directed to forward message to Kansas City, which is done, dated as per order, Somerset, Pa., via Baxter, and checked 14, collect. Kansas City understanding, of course, he is to collect the rate from Baxter.

Had the message been checked collect from Somerset to Baxter and then forwarded. It being checked "14, collect," as before, Kansas City naturally collected the rate from Baxter only, as in first instance, the result being Kansas City is overchecked by Baxter, who clears himself by returning a copy of forwarded message as cash. But how does Kansas City balance his error sheet, or where does the Company get their pay from Somerset to Baxter? Per rule there should be no amount stated in check, and though Baxter could protect Kansas City with an office message, it is irregular, and is not always thought of.

ANSWER.

When a message is received collect at an office on our line, and is subsequently forwarded collect, to another office on our line, the Manager of the forwarding office should check himself with the tariff from the sending station to his office. He should then check the office to which the message is forwarded for "this line" the tariff from his office to its destination, and for "other lines" the tariff from the sending office to his office, stating both amounts, as provided for by Rule 9. He thus obtains credit as "paid other lines" for the amount with which he first checked himself.

In the case given, where Baxter receives a collect message of 14 words from Somerset, which he forwards to Kansas City, all three points on our lines, Baxter should check himself $2.20, the tariff from Somerset to Baxter, and should check Kansas City 66 cents for "this line" and $2.20 cents for "other lines;" 66 cents being the tariff from Baxter to Kansas City. By checking Kansas City $2.20 for "other lines," Baxter receives credit for the amount with which he has checked himself with Somerset. The forwarded message should be checked: "14, collect 66 and $2.20," and should be dated "Somerset, via Baxter.

KANSAS PACIFIC RAILWAY,
Hays City, Ks., Station,
Nov. 10, 1871.

Editor Journal of the Telegraph:

DEAR SIR: Leavenworth, Kansas, is over 250 miles airline from me. I send him a message of 22 words, Government rates. Please give the amount of check, *per Ex. Order No.* 125. Does the part of the order that reads, "That no message shall be computed as less than *twenty-five* words," apply to messages where the tariff is at least 25 cents? GOVERNMENT RATE.

ANSWER.

Ex. Order No. 125, in relation to Government messages, must be construed exactly as it reads, viz.: "No message shall be counted as less than twenty-five words." All messages, therefore, of less than twenty-five words must be charged for as if containing twenty-five words. The tariff on a Government message of twenty-two words from Hays City, Kansas, to Leavenworth, distance over 250 miles, two circuits, is 50 cents.

INDIANAPOLIS, Nov. 23d, 1871.

To the Editor of the Journal of the Telegraph:

Please publish an answer to the following question: When we receive a message from another company for transmission to its destination by our lines, do we charge for three extra words in date up to twentieth, and four extra from that to thirtieth, or do we charge them for all they write before our date? For instance, we receive a message dated Hamilton, O., Nov. 23, how many words are we to charge for that date? Again, New York, 10th, via Indianapolis, &c., what are we to count? The example in Book of Rules may hardly be said to explain it fully, and we have had some controversy about it here.

M. D. BUTLER, Manager.

ANSWER.

"Hamilton, O., Nov. 23d," should be charged for as FIVE extra words. The rule is to charge the other Company for all they write before our date; *not less than three words*, to be charged for in any case. "Twenty-first," "twenty-second" &c, are each two words.

INTERPRETING RULES.

There can scarcely be a rule devised so broad or clear that some exception to it may not be found in its practical operation, and which, under some circumstances, may work injuriously. In such cases, the facts appeal to the judgment of the manager and test his ability. The following question is, perhaps, one of these:

"Suppose a party to inquire, during the evening, for a message, and at the time propose to pay the additional half rate on any "Red" message for him that might be waiting the usual time for delivery. Can it be delivered to him?"

Now it seems very arbitrary to answer NO; yet it is the only one which can be given. "Red" messages are a distinct service which contemplates a morning delivery, and if it has its disadvantages to the party addressed, to relax the rule would be to place messages under the operation of two systems, and lead to evil. To such looseness there could be no check.

At the same time there may sometimes occur some peculiar combination of circumstances, some peculiar danger, or some emergency which would justify a manager to deviate from the rule. The answer, however, remains, NO.

ANOTHER.

"Can a 'Red' message be delivered, under ordinary circumstances, the same night it is received, provided the party is willing to pay the additional half of the tariff?"

Answer.—No.

A LADY'S INQUIRIES.

NOVEMBER 13, 1871.

Editor Journal of the Telegraph:

DEAR SIR: Will you be so kind as to answer a few questions, if not too much trouble to you? 1st. Is there much demand for lady operators; and can a lady secure a good situation more easily by going to the Cooper School of Telegraphy and graduating? 2d. Who would be the proper person to apply to for admission to that Institute? 3d. How long do you think it would be necessary for a person to practice, to become a ready receiver by *sound*, who is already an operator of some experience in all else pertaining to a small office, and can read a very little by sound?

Will you please answer in the next number of the JOURNAL, and greatly oblige A LADY OPERATOR.

ANSWER.

1. Opportunities for employment are constantly occurring, and the evidence of ability shown at the Cooper School is undoubtedly an advantage.

2. Miss Lizzie H. Snow, Manager Ladies' Department, 145 Broadway, New York.

3. That depends. If your ear is good, with your present attainments, three to six months' faithful practice should qualify you.

The *Chicago Railway Gazette* has been from its first number a prince among American Journals, esteemed as it deserves at home, and valued by the highest scientific Journals abroad. No better proof of its energetic management could be shown than the fact that, though its whole material and offices were destroyed by the great fire, the *Gazette* has come along undiminished by a single number or line. We greatly regret our tardy acknowledgement of it.

THE FIRST IDEA OF A DIAL TELEGRAPH.

Dr. Quesneville, the author, quotes a few curious lines, taken from a work—"Récréation Mathématicque Composée de Plusieurs Problèmes Plaisantes et Facétieux," edited by Jean Leurechon, e S. J., Anno 1624, at Pont-a-Mousson—the main gist of which is that the *savant* just named, while speaking of the magnet (loadstone), suggests that if a person, A, had a powerful stone at Paris, and was provided with a dial plate, upon which the figures of the alphabet were engraved, and to which a movable magnetized needle was adapted, and a person, B, being at Rome, was provided with a similar apparatus, these parties might, by previously agreeing to enter into conversation with each other at a certain hour of the day, so arrange as to be able, by the aid of a strong magnet, to converse with each other. It appears that there was added to the original text an engraving representing the dial and needles alluded to. The work just spoken of has been republished in 1626 and in 1629 (printed at Rouen by Ch. Osmont). The passage alluded to also occurs in a work edited in 1636 by Wijnant van Westen, a mathematician at Nymegen (Netherlands), under the title "Mathematische Vermaeckelijkheden." This work is an improved Dutch translation of the work of Leurechon, who used to write under the pseudonym of H. van Etten.—*Chemical News.*

TESTIMONIAL TO A WORTHY MAN.

PORTLAND, Nov. 14, 1871.

To J. D. Reid, Esq.:

DEAR SIR: One of the best of operators has just graduated from the Bangor (Me.) office, and gone into mercantile business.

Mr. F. A. H. Pillsbury was one of our finest operators, and by his strict application and fine penmanship contributed greatly to the enviable reputation which our Bangor office hold as a first-class office.

Yours very truly,
J. S. BEDLOW, Supt.

We are glad to publish the above. Mr. Pillsbury was an honor to the craft, and will, we doubt not, honor his new vocation and "organize success."

Now that a time is at hand when the telegraph is required to transmit public documents and statements containing large numeral sums, we would suggest to telegraph operators the propriety of telegraphing these sums fully written out in words. As usually transmitted and copied these statements are a farce. For example, the Associated Press report of Treasurer Spinner's annual report, as printed in all the Cincinnati papers of Wednesday, gave the receipts of the year, including previous balance in the Treasury, as $980,904,349; expenditures, $870,986,872. Nor is this extraordinary, it is about an average specimen of the luck in transmitting large sums.—*Cincinnati Gazette.*

We think the caution well timed. The production in words will secure correctness, and give faith in the statements of public affairs by telegraph.

WORCESTER, Mass, November 20., 1871.

J. D. Reid, Esq.,

DEAR SIR:—In reply to the inquiry from Syracuse of November 9th, I would say that his information is erroneous. The regular force of this office consists of four operators, one of whom is engaged upon night press reports. Of course it could not be expected that this force could transmit the amount of press matter already stated, within the time given; and, also, attend to the largely increased regular business which the Convention would necessarily produce. But two operators were sent from the Boston office to aid us. Our press news was transmitted over six wires equally divided between Boston and New York. It was not my intention to detract a particle from the praise due Syracuse, but I considered the performance worthy a notice in your Journal. Yours Respectfully,

E. W. BRADFORD.

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FAMILIAR TELEGRAPH TALKS.

In attempting to continue our talk on the best mode of learning the alphabet, we referred to Pope's Manual to see what he had said on the same subject. After reading it over, although it occured to us that his teaching was rather solemn and his cautions somewhat abundant, yet it was perhaps superior to what we could ourselves provide, and we, therefore, copy from that excellent work:

HINTS TO LEARNERS.

In the excellent little manual of Prof. Smith, six elementary principles are laid down as the basis for practicing the alphabet, viz:

First principle. Dots close together.

I S H P 6

Second principle. Dashes close together.

M 5 ¶

Third principle. Lone dots.

E

Fourth principle. Lone dashes.

T L or cipher

Fifth principle. A dot followed by a dash.

A

Sixth principle. A dash followed by a dot.

N

The student may now proceed to practice upon the elementary principles.

1. Practice making *dots* at regular intervals, until they are produced with the regularity of clock-work, and of definite and uniform dimensions. The regular tick of a watch or of a short pendulum is a valuable auxiliary in acquiring this habit.

2. Next proceed to make dashes, first at the rate of about one per second of time, which may afterwards be slowly increased to three. The space between the dashes must be made as short as possible. If the upward motion of the hand, in forming the space, be made *full*, it cannot be made too quick,

3. The third principle occurs but once in the alphabet, and forms the letter E. It is made by a quick but firm downward movement of the key. In practicing upon this or any other character, it should not be repeated too rapidly, nor should the thumb and fingers be taken from the key in the intervals between the successive repetitions of the letter.

4. The fourth principle is somewhat difficult. The usual tendency is to make T too long and L too short It will be observed that the same character is used for L and the cipher or 0. Occurring by itself or among letters it is always translated as L, but when found among figures becomes 0. This would at first seem liable to cause confusion, but in practice it is found not to be the case. It was formerly the custom to make the cipher equal to three short dashes.

5. The fifth principle, which forms the letter A, may be timed by the pronunciation of the word *again*, strongly accenting the second syllable. The tendency of beginners is usually to make the dot too long and the dash too short, and more especially to separate them too much.

6. The final principle, the dash followed by a dot, usually presents some difficulties. The univers l tendency of the student is to separate the dot from the dash by too great a space. Time the movement by pronouncing the word *ninety*, with the first syllable somewhat longer than usual.

Having become thoroughly conversant with the six elementary principles, the following exercises may be taken up in order:

(1.) E I S H P 6

These should be practiced separately, until the right number of dots can be made invariably, the last dot in each being neither shorter nor longer than the preceding ones.

(2.) T M 5 L or cipher.

In practicing this exercise, care must be taken not to separate the dashes too much, and to make the final one in each letter exactly equal to the preceding ones. Observe not to make the M too short. There is a general tendency in beginners to shorten the final dash, where two or more occur together.

(3.) A U V 4

The usual tendency to make too much space between the dot and dash in the above letters, may be avoided by making them as if by prolonging the final dot in I, S, H and P.

(4.) I A S U

H V P 4

These are to be practiced in couples, as represented, the object being to impress upon the student the difference in the characters thus coupled together.

(5.) N D B 8

The student having thoroughly mastered the sixth elementary principle, he will have no difficulty in forming the above characters.

(6.) A F X Parenthesis

Comma Semicolon W 1

The only caution necessary in this exercise is to form the letters compactly, with the dashes of equal length. (See Exercise 2.) Observe, that the Parenthesis may be formed by running A U together, and the Semicolon by A F, etc.

(7.) U Q 2 Period 3

These differ but little from exercises previously practiced, and require no particular directions.

(8.) K J 9 Interrogation

G 7 Exclamation

J and K are generally considered the most difficult letters in the alphabet. Do not separate J into double N, and be careful that the dashes correspond in length. (See Exercise 2.) The figures 7 and 9 require care in spacing correctly.

(9.) O R & C Z Y

These are termed the "spaced letters," and require great care in order to make them correctly. The "space" should be just double that ordinarily used between the elements of a letter. The usual tendency is to make it too great. It should be just sufficient to distinguish these characters from I, S and H.

If the principles laid down in this work be firmly adhered to, the learner will be surprised, not only at the rapidity with which he masters what appears to be a very difficult lesson, but at the extreme accuracy with which he manipulates his instrument. He must also carefully bear in mind that one of the most universal faults, among those attempting to learn the telegraph art, is that of going over a great deal and learning nothing well.

READING BY SOUND.

This can only be attained by constant and persevering practice, keeping in mind the principles above given. The lever of the Morse apparatus makes a sound at each movement, the downward motion producing the heavier one, or that representing dots and dashes; or, more properly, the heavy stroke indicates the commencement of a dot or dash and the lighter one its cessation. A dot makes as much noise as a dash, the only difference being in the length of time between the two sounds. Thus, if the recoil or lighter stroke be dispensed with, it would be impossible to distinguish E, T and L from each other.

In learning to read by sound it is best for two persons to practice together, taking turns at reading or writing, and each correcting the faults of the other. The characters must first be learned separately, and then short words chosen and written very distinctly and well spaced, the speed of manipulation being gradually increased as the student becomes more proficient in reading. After becoming sufficiently well versed in the art to read at the rate of twenty-five or thirty words per minute, the best practice will be found in copying with a pen and ink from an instr - ment connected with a line employed in transmitting regular commercial messages, in order that the student may familiarize himself with the usages of the lines and the minute details of actual telegraphic business.

In conclusion, the student is warned against falling into the common error of expecting great results from little labor. To become an expert operator requires much time and patience, and the most unwearied application. Remember, that whatever is worth doing at all is worth doing well. The time will seldom or never be found when a thoroughly competent operator cannot obtain immediate and remunerative employment, however overcrowded the lower walks of the profession may have become.

MAGNETISM AND THE SUN.

What the wonderful immaterial agency may be by which matter in its free, elemental, metallic state influences and attracts other metallic matter at a distance, or by which the earth acting upon a balanced steel needles causes it to point to the pole, we are far enough from knowing; but whatever it be, it belongs to the solar system and involves the sun in its effects. It has been known for some years that the magnetic needle is in sympathy with the solar spots; that is, they each have eleven-year periodicities which coincide with each other. Great perturbations of the solar surface—cyclones in the sun's atmosphere—it is also known, are attended with agitations of the needle over large areas of the earth, which take the name of magnetic storms. It is a very natural supposition, therefore, that so grand an obstruction to solar influences as a total eclipse of the sun would result in some form of magnetic derangement on the earth, and this is the case to so important an extent that magnetic observations are now extensively provided for. Mr. Diamilla Müller records in the "*Gazette Official del Regno d' Etalia*," that on the 22d of December last, the needle followed its usual course until the commencement of the eclipse; then it went backward until 1:58 a. m., when it attained its maximum declination at the time the eclipse became total. Afterwards it resumed its movement westward, until it exactly took up the position occupied before the commencement of the eclipse.—*Galaxy*.

F. C. Gay, well known by New York operators, and who has more recently been in charge of the telegraph and express business in Wallace, Kansas, has just been elected to the Kansas Legislature by a very decisive vote. He is a man of undoubted probity of character, and we rejoice in his elevation.

The suit of *Hummaston vs. The American Telegraph Co.*, to compel payment of a contract to purchase, under certain conditions, certain machinery for punching paper, and for automatic transmission, has been before the courts for the past ten days, and has not yet terminated. The testimony involves the merits of the automatic processes, but we have no room to do more than thus briefly allude to the suit.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JAMES D. REID, Editor,

Executive Rooms, Western Union Tel. Co.,

145 Broadway, New York.

NEW YORK, DECEMBER 1, 1871.

VOLUME V.

The close of our Fourth Volume was marked by the day of National Thanksgiving. It was an appropriate ending into which we fully entered, not to particularize all which, on that day of turkey and cranberries, entered us. We hope all our readers were as happy, and not less grateful.

"When gratitude o'erflows the swelling heart
And breathes in free and uncorrupted praise,
For benefits received; propitious Heaven
Takes such acknowledgement as fragrant incense,
And doubles all its blessings."

Now we enter our fifth volume. We begin it with a glimmer of comfort from our past work. We are assured it has not been fruitless. The testimony comes from hands we never saw, but represent names honored and successful. We accept it as an encouragement. The year will be one of increased success, if the fulfillment of our desires bears any proportion to their present extent. The work of instruction has scarcely begun. We have much to learn, and therefore much to communicate. We shall be assiduous to acquire, and free to give.

The past year has been one of wondrous progress. It has seen the ends of the earth reached. Japan, Mexico, Australia now shake hands with wire-webbed Europe and America. The diplomacy of the world is now conducted largely by telegraph, the wires reaching and entering every court where civilization has erected intelligent authority. Nearly twenty thousand miles of cable has been added to the means of sub-oceanic communication, in addition to at least one hundred thousand miles more of land wires in all parts of the earth. Only one ocean now waits the living ligament which shall make the orient and the occident one. The girdle will then be complete. We expect to see its completion and join in its jubilee.

Now comes a greater work. The telegraph has to be made a companion, a part of home, an eye to commerce in all its minor details, giving ubiquity to authority, and prescience to power. A vast development of its capacity in its local uses has already been made, and the history of which we are soon to give. Its employment on railroads is entering new phases, and will prove their grand guardian and guide. On one or two roads the sweeping trains already mark their transit in front and in rear, so as to command undisturbed possession of the track and secure immunity from danger. In Europe this is already becoming common. This power the wire gives them. It will do much more some coming day. The science of the century seems brooding with its calm brow over the possible limits of the realm which electricity, occult, subtle, mysterious, omnipresent, is to reach, and over which it is to reign.

INTERNATIONAL OCEAN TELEGRAPH CO.

A printed statement, issued by the International Ocean Telegraph Co., makes the following exhibit of its affairs:

1870.	
Receipts from all sources, . .	$264,283 80
Expenses, ...	153,837 54
Profit 1870, ...	$110,446 26
1871.	
Receipts from all sources, .	$214,278 77
Expenses, ...	140,607 32
	$73,671 45
Add payments made on account of previous years, ...	$13,565 48
Actual Profit of 1871, . .	$87,236 93

The estimated loss to the company, caused by the interruption to the cable between Punta Rasa and Key West, is stated at $49,000.

Allowing the payments on accounts of former years and adding the estimated losses referred to, the two years would stand in the following relation to each other:

1870, Profits, ...	$110,446 26
1871, "	136,236 93
COMPARISON IN STERLING.	
Actual earnings, 1870, ...	£20,453
Actual earnings, 1871, ...	13,642
1871, with allowances added, . . .	25,229
CURRENCY INDEBTEDNESS.	
Bonds unpaid, ...	$125,800
Scrip issued and unredeemed, . .	117,084
	$242,884
CAPITAL.	
Common stock, ...	$850,000
Preferred, ...	650,000
	$1,500,000

The statement, notwithstanding the special disasters of the year, which are exceptional, and may not occur again for some time, show a healthy business and a valuable stock.

The suit of *Hummaston vs. The American Telegraph Company*, which has been before the courts in New York during the last ten days, and which called together a number of telegraph experts, was closed on the 29th, by a verdict for the plaintiff, of $7,500. The suit involved the value of the automatic processes to which we may again refer.

THE LECLANCHE BATTERY.

LONDON, 11th Nov., 1871.

The Editor Journal of the Telegraph.

Sir:—In number 95 of the JOURNAL OF THE TELEGRAPH, I observe a mistaken statement with regard to the Leclanché or peroxide of *Manganese* battery, copied from the London *Chemical News*, and to the effect that these batteries at the Post Office have to be removed after an hour's work.

It is true that this battery does not answer for a local, but it is of the very greatest service for a line, especially at stations where there is but little business, for at such a station it will last for nine or twelve months without attention, if the connections be well varnished, and if evaporation be prevented.

In the British Postal Telegraph Service we have many thousand cells, a very small proportion has at present been worn out or replaced; but we have never used them as locals.

It is right to add that the writer of the article you produce, has corrected his statement in the *Chemical News*, Oct. 6th.

I need not say that we do not use constant currents on your plan, but work by *making* instead of by *breaking* the battery circuit, so that our battery is in use only when signals are being transmitted.

I am, Sir, yours faithfully,

R. S. CULLEY,

Chief Engineer Postal Telegraphs.

We read an article not long since narrating how a repairer, having been sent out to remove an obstruction on the line, claimed to have found the trouble in the local battery. Of course, he was ridiculed. The local battery being on a circuit of its own, and entirely local, no such obstruction was, of course, deemed possible.

Not so fast. The laugh may be on the other side. Common men sometimes find what scientists fail to discover. The repairer in this case even, may be correct.

It is well known that the burning of the silk on the coils of relays, by lightning, is far from being uncommon. This burning not unfrequently takes place on the convolutions of the silk covered wire nearest the core, so as to bring the core of the magnet in the main circuit. It is equally well known, also, that the armature of the relay is often brought up very close to the faces of the cores, upon fine adjustment, or rather when the current is, from any cause, weak. Under such circumstances, the touch of the armature on the core, is all that is needed to connect the main with the local circuit.

This contact, however, would be harmless were care always taken to have the local battery in a dry place, and carefully tended. Often, however, it is put in damp cellars, often even on their floors. This gives, of course, a good ground connection. It is under such circumstances that an escape through the local connections is easy, and, indeed, frequent. Care in all these matters is essential. The manager of an office should be suspicious of every thing which can in the most minor degree impair the line currents. He may take a hint even from a repairer, and those who have their locals stowed away in damp places should see that a change is immediately made.

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STAMP FRANKS.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
New York, November 17, 1871.

Executive Order, No. 133.

INSTRUCTIONS FOR THE USE OF STAMP FRANKS.

The conditions printed on the cover of each of these Franks are as follows:

CONDITIONS.

"This Frank is intended to cover only the personal and private messages of the holder and answers thereto. It is not designed for business or political communications.

"A stamp must be affixed to every message containing twenty words or less, not including address, date or signature, and an additional stamp for every additional twenty words or less.

"If the sender desires to have an answer returned free, he may Frank it by affixing to his message the stamps required under the above rule.

"The holder of this Frank, by accepting and using it, assumes all risks, and agrees that the Telegraph Company shall not be liable for damages, whether from negligence of Agents or from whatever cause arising."

INSTRUCTIONS TO MANAGERS.

The stamps are inclosed in covers, on which are inscribed the name of the person to whom the Frank is issued, and the territorial limits within which it should be used.

Each stamp bears the number of the book inclosing it, and all stamps issued to the same person during the year, will bear the same number.

Receiving Clerks should satisfy themselves, if possible, by inspection of the book, or otherwise, that stamped messages are signed by or addressed to the party to whom the Frank was issued. But they have no discretion to refuse a message when properly stamped, unless they have reason to believe that neither the address nor the signature is that of the Frankholder. A stamp is conclusive, unless there is evidence to the contrary.

It is proper, however, to call the attention of the customer to any violation of the conditions, in respect to territorial limits, or to the business character of the message offered. Gross abuses of privilege should be at once reported to the Superintendent.

Anything in Executive Order, No. 119, conflicting with the above, is hereby revoked.

WILLIAM ORTON, President.

GOVERNMENT MESSAGES.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
New York, November 23, 1871.

Executive Order, No. 134.

The contract entered into between the United States Government and this Company, dated 1st November, 1861, having expired by limitation on the 1st November last, hereafter no government messages will be transmitted free on subsidy account over the Pacific Line from Omaha or Brownsville, Nebraska, to San Francisco.

WILLIAM ORTON, President.

THE ANGLO-AMERICAN CABLES.

So much has been said respecting the purchase by the English Government of the Anglo-American Cables, that, at our request, the following messages have been placed at our disposal:

H. Weaver, Manager, Anglo-American Telegraph Co., London:

Some newspapers here assert that the English Government are negotiating for the purchase of the Atlantic Cables. Is there any foundation for this assertion? Has any person connected with the English Government said anything to you or any Director of the Anglo-American Company on this subject? Please answer fully by telegraph. CYRUS W. FIELD.

Saturday.

C. W. Field, New York:

No such negotiations have been commenced, and, so far as I know, the assertions are entirely void of foundation. WEAVER.

WEST INDIA AND PANAMA TELEGRAPH COMPANY.

Editor Journal of the Telegraph:

In a former issue you criticized the correctness of the following statement of Sir Charles Bright, as published in the Prospectus of the West India and Panama Telegraph Co.:

"Sir C. Bright, who has recently returned from the West Indies, has made a report upon the probable revenue to be derived from the Company's lines. This report, prepared from estimates, based upon *official returns*, and the *actual results of the existing Cuba Line (earning* after 18 months' working at the rate of £60,000 a year) fixes the probable receipts from messages on the Company's lines at £156,000 a year, and the working expenses at £20,000 a year."

I inclose you the official returns of the INTERNATIONAL OCEAN TELEGRAPH COMPANY, for your justification. If the earnings of years, prior to 1870, justified Sir Charles Bright in his statement, all will be pleased to know it. If such prove to approximate £60,000 per annum, it will be the first instance, yet known in the records of any company, free from opposition and under an admirable superintendant, where the earnings have fallen off from 40 to 60 per cent below its former revenues.

I and others object to the statement for several reasons:

1. Because we regard it as evidently and grossly incorrect.

2. Because it was unnecessary.

3. Because it renders every Director of the West India and Panama Telegraph Co., personally liable for all investments made therein. As a proof of this, we present the case of Peek and Overend, Gurney & Co., in London, where the court has just decided that a misstatement of fact in the prospectus would have entitled the investor to recover if his action had been sufficiently prompt. The present seems a time to insist on the strictest regard to truth in telegraph as in all other enterprises. MERCATOR.

Scribner's Monthly is, of its kind, the most acceptable which reaches our table. Its articles are cheerful without being low, and pure without being constrained. It is a magazine which is pre-eminently fitted for the table of an intelligent and refined home.

We begin with this number our "Familiar Telegraph Talks," and hope to keep them up regularly hereafter.

The commencement of a new volume should suggest to all subscribers the duty of sending us a dollar each. We help the suggestion by proposing attention to it.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
December 1, 1871.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since Nov. 15th, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

262	Acton, Ind.	372	Marianna, Ark.
30	Barton Landing, Vt.	397	Milton, Van Buren Co., Iowa
	Brownsville, Texas, tariff,	123	Oakland, Md., re-opened.
	$1.00 more than square,	109	230 Oakleys, Mich.
*	Boseman, Mon.	140	Petersburgh, Clarion Co., Pa.
139	Cassadaga, N. Y.	52	Raritan, N. J.
500	Corsicana, Texas.	260	Richmond, Allegan Co., Mich
228	Camilla, Ga.	139	Sinclairville, N. Y.
437	Edgarton, Mo.	152	Salem, W. Va.
377	Iowa, Ill.	500	Tehuacana, Texas.
39	Leicester Junction, Vt.	41	Westchester, N. Y.
337	Mt. Pulaski, Ill.	337	Warrensburg, Ill.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.	*Leaves this Line.*
Boseman, Mon.	150 10	Helena, Mon.

OFFICES CLOSED.

Cochran, Ga., Eastman, Ga., Hawkinsville, Ga., Lumber City, Ga., and Union, N. Y.

GENERAL INFORMATION.

The name of the office heretofore known as East Sandy Creek N. Y., has been changed to Lacona, N. Y.; that of Coalsmouth, W. Va., changed to St. Albans, W. Va., and Okaw, Ill., changed to Arcola, Ill.

Business for Communipaw, N. J., will hereafter be delivered from Communipaw Stock Yards, N. J. Charges for delivery, 25 cents.

Hereafter, messages for Harrison Square, Mass., will be sent and checked to Boston, Mass., charges for delivery, 50 cents.

Brownsville, Texas, is excepted from the night message "half rate" system.

The P. O. address of Sinclairville, N. Y., is Gerry, Chautauqua Co., N. Y. P. O.

112 Petersburg, Pa., is in Huntingdon Co., Pa.

Elwood, Kansas, new office in last JOURNAL, is in square 446.

The tariff to square 109 is 10 cents more than to square 493.

OFFICES HAVING "SPECIAL SHEET A,"

Will hereafter check Macon, Ga., 25 cents more than "special rate" to Savannah, Ga.

ATLANTIC CABLE BUSINESS.

We are notified that a new route to Japan, via the Great North Western Telegraph Co., through Russia, is now open. Tariff as follows:

From London to Nagasaki:

For 20 words or less, $21.50.

Half the 20 word rate for every additional 10 words or fraction of 10 words.

Messages by this route must be addressed "*via Russia,*" which words *are not charged for* beyond London.

Messages for places in Japan, other than Nagasaki, must be addressed "post Nagasaki," and these words *must be charged for*; but no charge is to be made for postage.

WILLIAM ORTON, President.

As there is but one style of message envelopes for all classes of communications, of course no one is able to discriminate as to the importance of one over another. It thus happens that where a party is in the frequent reception of communications by telegraph, they are all indiscriminately laid upon the desk or table to await his return to business, or his arrival, if absent. Should one of these be respecting death, or extreme danger, it of course remains with the others, and, occasionally, leads to much bitter disappointment. Thus a party leaves his office at 4 p. m. A message arrives at 4:30, and remains until morning. It is easy to appreciate the circumstances of such a case.

A distinguished jurist in an Eastern city, who not long since suffered from this cause, suggests that all messages relating to death be enclosed in a *mourning envelope*, so that instant attention may be given to them, and their urgency be thus indicated. The suggestions which come from actual experience are always worthy of attention.

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PRESENTATION.

CAPTAIN WILLIAM MACKINTOSH.

Capt. Mackintosh is, as most people know or should know, foreman of the mechanical work and cable laying of the Western Union Telegraph Company in and around the city of New York. His work is always done well and carefully, and, although usually crowded with imperious demands for many things, all to be executed at once, usually does them, and so preserves the general content. It is comfortable to have him round. His work has been done also without harassing and badgering his men, but, on the contrary, has begotten for him on their part, a respect and deference which has made work on both sides a pleasure. Not only so, but throughout the fraternity he has secured for himself a feeling of respect and friendship, which alone can explain what we have now to narrate.

About 5:30 P. M., Wednesday, Nov. 29, as the captain was busy at his desk, making allright for Thanksgiving, and looking forward as all men with royal stomachs had a right to do, to the turkey and cranberry sauce of the coming day, he was suddenly pounced upon by a large body of men, whose first appearance was apt to convey suggestions of alarm. But it required but a moment to unmask its friendly purposes, and the captain was asked by voices he knew, to face the crowd. Mr. W. K. Applebaugh was thereupon called to preside, who, after requesting Mr. Mackintosh to give the meeting his attention for a moment, called on Mr. John Gough to explain fully the object of the gathering.

Mr. Gough thereupon addressed Capt. Mackintosh, as follows:

"I have been selected by a number of your friends to present to you, on their behalf, the beautiful gold watch I hold in my hand, and to request your acceptance thereof, as a token of the esteem in which they hold you. It is not presented to William Mackintosh, foreman, but to William Mackintosh, the man. Wear it for our sakes, and let it be a perpetual memory to you of the esteem which prompted the gift."

The watch bore the following inscription:

Presented to
WILLIAM MACKINTOSH,
By his Telegraphic Friends.
New York, Nov. 30, 1871.

As soon as Capt. Mackintosh had recovered himself, he feelingly responded somewhat as follows:

My Dear Friends:—You have surprised and embarrassed me. It is difficult for me to understand why I should be the recipient of such a gift. What have I done to cause you to make me such a testimonial? I have done nothing which each of you, my friends, has not as fully done. We have each done our duty, to the best of our ability. We have done it without hope or expectation of any unusual reward. We have done it because it was right and honorable to the great Company we serve, to do our work well and heartily. To what then can I attribute this most unexpected and handsome gift?

Ah! well, friends, it may be unkind in me to be too anxious about the cause of this gift. I take it to be the exponent of that fraternal feeling which is becoming, haply, so characteristic of the telegraphic craft, and which finds, on this occasion, an avenue through me. I ought to be proud of my fellowship with you, my telegraphic friends, as I am grateful for your expression of it to me. And to you, my men, some of whom I see before me, who have served me so faithfully and so well, let me express my heartiest thanks that although in our duties I have to direct and you to serve, yet when our work is done, we are alike friends.

I accept, therefore, your gift, gentlemen, with becoming gratitude and surprise. This golden recorder of time shall, I know, record no time to me, when this night with its gift and cheer, will fade from my memory and my heart.

TELEGRAPHERS' MUTUAL LIFE INSURANCE.

ASSESSMENT NO. 23.

22	25	26	27	29	30	31	42	54	59	65
67	70	74	75	76	93	97	98	103	106	114
120	121	127	133	138	143	166	199	210	215	228
232	233	246	275	298	302	303	367	402	418	429
447	461	464	466	467	468	469	470	471	474	477
483	484	494	499	506	511	512	524	561	562	570
576	588	592	628	629	631	649	701	717	721	730
731	732	733	734	737	738	764	771	795	797	808
813	878	883	896	905	911	916	927	935	946	951
953	966	980	1023	1024	1029	1030	1031	1032	1033	1034
1035	1040	1041	1050	1057	1058	1059	1061	1069	1071	1072
1085	1087	1100	1101	1104	1147	1149	1165	1166	1169	1170
1177	1184	1187	1196	1208	1211	1221	1224	1230	1232	1245
1246										

ADDITIONAL TO ASSESSMENT NO. 23.

19	107	237	318	434	440	573	587	676	922	979
1013	1086	1152	1220	1226	1227	1237	1239			

ASSESSMENT NO. 24.

5	6	21	22	27	29	40	42	46	52	53
54	55	56	59	60	65	71	72	76	78	80
83	88	93	95	99	101	103	106	113	114	120
121	127	129	131	134	141	142	144	145	148	150
157	162	166	172	175	176	182	185	186	187	192
199	201	202	206	210	211	215	217	220	228	231
235	239	240	244	246	254	255	257	269	273	274
275	276	277	278	279	280	281	282	283	285	287
288	291	297	301	302	312	319	333	342	344	346
349	351	352	378	383	385	391	392	393	394	397
406	416	417	418	420	422	425	426	428	430	431
433	438	441	464	476	483	484	485	494	495	496
497	499	500	503	504	505	506	507	510	511	512
515	520	533	546	547	548	549	555	556	557	561
562	566	570	576	577	586	590	592	594	602	628
629	630	632	660	662	663	664	665	669	672	678
680	685	692	695	697	703	711	715	720	722	730
731	732	733	740	750	751	756	758	762	764	769
775	776	780	781	782	783	784	785	786	791	795
797	798	799	800	802	803	808	809	812	813	820
821	822	830	831	832	836	838	841	842	844	873
875	876	883	896	901	905	907	915	916	926	940
944	951	952	966	977	978	980	995	1000	1002	1005
1006	1009	1011	1030	1031	1032	1033	1034	1035	1039	1043
1047	1048	1053	1055	1056	1057	1058	1059	1062	1069	1072
1073	1074	1075	1076	1081	1085	1087	1088	1090	1094	1100
1101	1104	1118	1125	1126	1139	1141	1142	1144	1145	1146
1148	1150	1163	1165	1166	1167	1169	1170	1172	1175	1177
1182	1183	1189	1190	1198	1199	1200	1202	1203	1205	1208
1211	1213	1214	1215	1216	1222	1224	1225	1229	1232	1241
1246	1248	1252	1255	1256	1257	1259	1262	1263	1264	1266

ADDITIONAL TO ASSESSMENT NO. 24.

61	69	97	107	154	156	160	164	180	237	315
318	319	354	405	434	478	481	508	527	528	536
554	569	574	579	595	600	623	648	656	676	684
700	723	724	725	728	743	744	773	774	790	804
817	823	850	869	871	886	897	899	908	911	912
914	922	930	931	938	940	942	945	954	955	956
957	958	959	960	963	964	1025	1038	1042	1054	1071
1080	1086	1152	1164	1180	1181	1210	1226	1227	1231	1234
1235	1236	1238	1239	1240	1253					

We are pleased to notice the presentation to T. C. James, Esq., Superintendent of Telegraphs on Prince Edward Island, and his new and handsome bride, of a handsome tea service. Pleasant and felicitous addresses were made by the donors and pleased receivers. Mr. James was married to Miss Sophie E., daughter of James G. McKeen, Esq., of Port Hastings, C. B., October 31. Joy be with them.

WANTED,

By a young lady, a situation as telegraph operator, "Sound." Would prefer a place in or west of New York. Address, for two weeks, Miss EMMA E. NORTON, Boston, Mass.

THE LOCAL BATTERY.

We have mentioned two things essential to a local battery, namely:

1. That no more sulphate be placed therein than is necessary for a fair product of sound, and that anything beyond this causes over action, creates deposits which initiate local action within the cell, and which ultimately and speedily destroys the power of the battery, although the material of which it is composed may be largely unconsumed.

2. That the zinc should never, under any circumstances, be allowed to touch the porous cell, the effect of such a contact being practically to ignore the purpose for which it is employed. This is seen in the copper deposits so much complained of on the walls of the porous cell, and which will cease to exhibit themselves, unless the porous cells are very impure, when the zinc is either suspended, or separated from the cup by supporting it on wood or glass. We incline to prefer suspension.

We now mention two additional items:

1. It will be remembered that Mr. Walker stated that he kept his battery in a close box. This is an important item in a constant battery. Its object is simply to prevent evaporation of the water of the cell, and by which the primitive action within is preserved unchanged. Evaporation in warm weather is very rapid, and this is made evident by the frequency with which the cups have to be filled. The reduction of water, of course, increases the proportion of the sulphate, and so by simple evaporation, the battery over acts, as in the case of an over supply of the sulphate. An air tight box in a dry place partially prevents this.

2. A plan extensively used in France is the pouring of a little oil in the liquids to prevent evaporation, which it accomplishes perfectly. It is worth while to try it, if only to see what a curious garden will, in a few weeks, grow upon the oil surface, beginning with the positive cell.

BORN.

On November 22, to B. S. BYNUM, manager W. U. office, at Horn Lake, Mo., a son.

MARRIED.

FULTON—PATTON.—At the residence of the bride's mother, Nov. 14, 1871, by the Rev. Dr. Mophat, Mr. Frank Fulton operator, Gen'l Supt's. office, Kansas & P. R. W., Kansas City, Mo., to Miss Hennie A. Patton, of Wheeling, W. Va.

WAGONER—WILLETT.—At Burlington, Kansas, September 12th, Mr. H. M. Wagoner, of Emporia, Kansas, to Miss Fannie E. Willett, of the former place.

MOORE—MAJOR.—On the 14th ult., at the residence of the bride's father, 1121 Vine street, Philadelphia, Mr. J. Charles C. Moore, of W. U. Continental Hotel office, to Miss Emily J. Major.

MALIN-MILES.—At the residence of Genl. James A. Beaver, Bellefonte, Pa., Thursday, Nov. 23, 1871, by the Rev. N. T. Nylie, Wilmer L. Malin, manager Bellefonte office, to Miss Lizzie H. Miles, of the same place.

JARVIS—COBURN—At the Messenger House, in Cortland, on Wednesday, the 8th day of November, 1871, by the Rev. J. M. Benedict, Mr. Albert J. Jarvis, Manager W. Union Telegraph office, and Miss Ada B. Coburn, both of Cortland.

"Thus hand in hand through life we'll go;
Its checkered paths of joy and woe
With cautious steps we'll tread."

We extend congratulations to the bride, for having secured one of Cortland's nobliest young men, and to the groom for having won to himself, one of her fairest and most accomplished daughters.

DIED.

OSBORNE—At Navasota, on the 10th inst. J. M. Osborne, of pneumonia. He had been for twelve years in the employ of the Western Union Telegraph Company, and up to the time of his death was Telegrapher at Navasota.

One of his companions writing of him from Hempstead, Texas, says: "Joe was one of our very best men, a man, beloved by all on the line and not least by his Superintendent, Mr. Shepherd." He was not a member of the Insurance Association.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 2. NEW YORK, DECEMBER 15, 1871. WHOLE NO. 99.

THE PRESIDENT'S MESSAGE.

THE POST OFFICE AND TELEGRAPH SYSTEM.

The enlarged receipts of the Post Office Department, as shown by the accompanying report of the Postmaster General, exhibits a gratifying increase in that branch of the public service. It is the index of the growth of education and of the prosperity of the people, two elements highly conducive to the vigor and stability of republics. With a vast territory like ours, much of it sparsely populated, but all requiring the services of the mail, it is not at present to be expected that the department can be made self-sustaining; but a gradual approach to this end from year to year is confidently relied on, and the day is not far distant when the Post Office Department of the government will prove a much greater blessing to the whole people than it is now. The suggestion of the Postmaster General for improvements in the department presided over by him are earnestly recommended to your special attention. Especially do I recommend favorable consideration of the plan for uniting the telegraph system of the United States with the postal system. It is believed that by such a course the cost of telegraphing could be much reduced and the service as well, if not better, rendered. It would secure the further advantage of extending the telegraph through portions of the country where private enterprise will not construct it. Commerce, trade, and above all, the efforts to bring a people widely separated into community of interest, are always benefited by a rapid intercommunication. Education, the groundwork of republican institutions, is encouraged by increasing the facilities to gather speedy news from all parts of the country. The desire to reap the benefit of such improvements will stimulate education. I refer you to the report of the Postmaster General for full details of the operations of last year, and for comparative statements of results with former years.

POSTMASTER GENERALS REPORT.

THE POSTAL TELEGRAPH

is by far the most important subject now inviting consideration in connection with the transmission and interchange of intelligence. The governments of the continental countries of Europe have, with few exceptions, claimed and exercised for years past the right of controlling and managing the electric telegraph, and in every instance with a degree of success commensurate with the care and attention bestowed upon their respective administrations. In Sweden, Norway, Russia, Bavaria, Italy, Turkey, Greece and Spain great advantages have been gained by making the telegraph a part of the public postal system; while in Switzerland, Belgium, the Netherlands, Prussia and France, where modern appliances and improvements have been more thoroughly utilized, the policy of governmental control has been fully vindicated. It remained for Great Britain to give a practical test of the public system as compared with the management of corporations and companies of private stockholders. After a protracted and most laborious investigation, Parliament passed, on 31st July, 1868, "An act to enable Her Majesty's Postmaster General to acquire, work and maintain electric telegraphs," which was followed on the 9th August, 1869, by an act providing money necessary to purchase the undertakings of the several telegraph companies in Great Britain and Ireland. On the 5th February, 1870, the transfers were effected, and the work of the postal telegraph began. At first serious difficulties were encountered by reason of the delay in passing the money bill and the inadequate preparations to accommodate the immense increase of business which immediately followed the large reduction of rates. These difficulties however, were soon overcome, and, thanks to the indefatigable and intelligent labors of Hon. Frank Ives Scudamore, second secretary, and his assistants, the advocates of the measure can already boast of its triumphant success. The charges established in the beginning were uniform throughout the United Kingdom, without regard to distance, and were fixed at the maximum permitted by law, that is to say, one shilling (twenty-four cents) for the first twenty words or part of twenty words, and three pence (six cents) for each additional five words or part of five words, exclusive of signature and address.

Some may hesitate to adopt this system in this country because of the great extent of our territory, the paucity of our population in certain large sections, and the great expense involved in extinguishing the rights of telegraph companies. The first two are the same objections that were urged for many years against all ameliorations of our postal service, nevertheless, postages have been cheapened and made uniform, and at the same time the postal system has been maintained and improved. Rightly viewed, the extent of the country is a strong argument in favor of a postal telegraph and the additional facilities and uniform rates it will afford. It is only in countries of large extent that the value of instantaneous, or nearly instantaneous communication can be appreciated. Who that desires to convey or acquire any information would hesitate beween sending a telegram from New York to California in seven minutes for twenty cents, and sending a letter in seven days for three cents?

It is true that a large sum of money will be required for the purchase of the present telegraph lines and their appurtenances. But if this be a difficulty delay only magnifies it; for, admitting that the government must at some time become the exclusive proprietor of the telegraphs, it is clear that every year will add to the amount of purchase money it will have to pay. The companies now in existence will extend their operations and new companies will be organized from time to time, all of whom would demand compensation for a surrender of their privileges and property. I therefore deprecate further delay as injurious to the public interests. The Post Office Department is now prepared to undertake the organization and management of the telegraph in connection with its other duties. Indeed, I believe that the department itself can aid materially in raising the the money needed for the purchase through Post Office savings banks if Congress will authorize their establishment. The security of the government being the best that could be obtained, many depositors would give it the preference over every other. By paying four per cent interest, at most, on deposits, a large fund could be readily accumulated and invested under the direction of the Treasury Department in the public securities. The proceeds of those investments could be used to reimburse the original purchase money and all other expenditures for construction and repairs.

To prove the feasibility of this plan, I recur to the history of the British office. Savings Banks in connection with post offices were established in Great Britain on the 16th of September, 1861, with a limitation in the law creating them, that they should not pay exceeding two and one-half per cent interest on deposits.

The total amount in hand after ten years' operation, and for which the British government pays only 2½ per cent interest, is £15,466,928, or $75,145,690—a much larger sum than will be required for the purchase and thorough repair of all the telegraph lines in the United States.

Convinced of the wisdom of establishing the postal telegraph and Post Office savings banks in the country, I earnestly recommend the passage by Congress of the laws necessary therefor. In my judgment those laws should provide as well for the absolute purchase of the lines and appurtenances of all telegraph companies in operation as for the exclusive right and authority of the government, after the several purchases shall be concluded, to conduct the business of transmitting telegraphic messages.

IN CONGRESS.

IN COMMITTEE OF THE WHOLE.

THE GOVERNMENT POSTAL TELEGRAPH PROJECT.

Mr. RANDALL, of Pa., called attention to that resolution which referred to a select committee all that portion of the President's Message, relative to the union of the telegraphic system with the postal service, and all other questions of subsidies to steamship lines. He did not see why that subject should not go to the Committee on Commerce or to the Post Office Committee. The owners of the telegraph lines of the country had estimated the cost of those lines to the government at $25,000,000. He had heretofore seen the evil effect of creating select committees to consider special subjects. He remembered that when the first Pacific Railroad committee was established, the Speaker of the House made it up in the interest of the railroads, and that that committee was prepared to give away all the land of the nation. He thought that this subject should take its natura course and go to the appropriate standing committee.

Mr. FARNSWORTH, Chairman of the Post Office Committee, moved that the subject be referred to the

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Post Office Committee; not that he cared to have jurisdiction of the matter, but because it seemed to him that no other committee could have proper jurisdiction of it. He did not know what reason existed for the appointment of a select committee, although he was aware that a select committee on the same subject had been created during last Congress, and had arrived at no conclusion.

Mr. DAWES remarked that he had been on that select committee last Congress, and had joined in the minority report against the proposition. The experience which he then had had led him to believe that the subject was one of very great importance. It affected the treaty, the postal affairs and the foreign affairs of the country, so that no one committee could be said to have jurisdiction of the whole matter. It was a great subject, worthy of the consideration of the country, and which was being forced upon its consideration by the events and tendencies of the age. If anything required a special committee, which would have the time to consider it fully, it was this subject. If the gentleman from Pennsylvania (Mr. Randall) thought the Speaker had not the confidence of the House in the appointment of a select committee he might have a vote upon that question.

MR. RANDALL—I have nothing to say on that point further than I have said.

Mr. DAWES went on to say that he favored a select committee, not from any want of confidence in the Chairman of the Post Office Committee, or in the chairman of any other committee, or in any committee, but because he was convinced that the ramifications of the whole question were such that with no propriety could it be referred to any particular committee.

Mr. NIBLACK, of Ind., suggested that this project would entail immense patronage on the administration, which would have the appointment of at least 8,000 employes to take charge of the telegraphic business, which fact made the proposition an appalling one to him, and would control his vote against it.

Mr. DAWES admitted that there were undoubtedly difficulties in the way; but that fact rather rendered it more appropriate that the subject should be referred to a select committee.

Mr. NIBLACK conceded that there were many reasons why it should go to a select committee instead of a standing one, but he should be unwilling to trust any committee that was specially organized for the purpose. The temptation would be absolutely too great; the committee would have no other business to attend to, and would be the focus around which all influence would be brought to bear in favor of the scheme.

Mr. FARNSWORTH understood that it was proposed to incorporate with every Post office in the country that had a sufficient number of inhabitants, a telegraph office, and to make every Postmaster a telegraph operator, or else to appoint an expert to operate the telegraph. The government would thus have cognizance of all the private, confidential and financial business of the people. Every Member of Congress would be importuned by his constituents to make their Post Office a telegraph station. The Post Office Committee has been appointed without reference to this subject, and might, therefore, be presumed to be quite as fair as one that would be appointed specially. As a general rule, the best and fairest committees were the standing committees of the House. He was willing to admit that he had gone over the whole subject of postal telegraphs, and had for weeks and weeks listened to arguments for and against the proposition, and was against the whole scheme. The success of the system in Great Britain or any thickly settled old country, where no new post office had been established for fifty years, formed no criterion for this country and those institutions. The whole thing was monstrous in any way that it could be regarded.

Mr. BANKS, of Mass., remarked that the question of ocean cables was in the jurisdiction of the Committee on Foreign Affairs, and moved that that point be stricken off the pending resolution. (In this Mr. DAWES assented and the resolution was modified accordingly.) He did not think it absolutely necessary to have this subject referred to a select committee, although it involved questions of great importance. He thought it best for the interests of the country and for the business of the House, that select committees should be avoided whenever there was a permanent standing committee to which the subject could appropriately be referred.

Mr. BECK, of Ky., said he had been a member of the select committee which had had charge of the subject last Congress, and that the cost and effect of the project had been understated to-day. There were now some five thousand telegraph stations in the country, with seventy-seven thousand miles of line and seven thousand employes. Under the government plan there would be at least twenty thousand telegraph offices, one hundred and fifty thousand miles of line and twenty-five thousand employes. The gentleman from Pennsylvania (Mr. Randall), had understated the cost nearlyone-half.

Mr. RANDALL—I always like to be on the safe side.

Mr. BECK—And the gentleman from Indiana (Mr. Niblack) will find that instead of increasing the government officials by 8,000 they would be increased by 25,000. The minority of the committee had stated in its report last Congress the great objection to the project was that the government telegraph would be used for political purposes, through an array of officeholders. The facilities for thus using the wires would be a temptation so strong and would be so difficult to detect that it might well be doubted whether the administration would refrain from such use of them. I believe that the Committee on Appropriations is the proper committee to consider the subject, for that committee would be very careful in recommending anything that would take from the people not thirty-five millions but nearly seventy millions of dollars. He did not believe that the committee would ever sanction such a scheme or ever consider it for a moment.

Mr. RANDALL remarked that Mr. Dawes had, with his usual adroitness in debate, sought to place him in the position of finding fault with the Speaker. He would not take back anything he had said; but could reiterate the statement that the Pacific Railroad Committee had been composed originally, not by the present but by the then Speaker, of members avowedly in the interest of the railroad. It was customary when a select committee was to be appointed on any given subject, to choose a majority of those who were favorable to the proposition, and therefore he wished to stop this scheme of plunder right at the threshold. He was informed that originally the whole of the telegraph line had not cost more than two or three millions, and now the company had the effrontery to go to Congress and ask that its property be taken by the government at its present appreciated value. He would oppose the scheme, because if carried out, it would place the whole private and business transactions of the people under the scrutiny of government officials. The country had had enough experience of attempts of that kind, and he wished to have no further steps taken in that direction. He hoped that the House would squelch the thing at once. Here was a beautiful specimen of civil service reform, of which they had heard so much, increasing the employes of the government by 25,000 at one piece of legislation.

Mr. DAWES did not understand that there was any project recommended here. The statement by Mr. Randall, that the telegraph company asked Congress to purchase its property at an enormous rate, showed that that gentleman did not understand the relations of the matter any more than a baby. (Laughter.) The Western Union Telegraph Company was arraying itself with all it power and influence against any such proposition.

Mr. BECK remarked that while the Western Union Telegraph Company had opposed the project last Congress, he understood it to have changed its position, and to be now anxious for it.

Mr. DAWES said that that fact would not commend the matter to his approval, but this was not the time to enter into the merits of the whole subject. The only question was as to its reference.

THE SUBJECT REFERRED TO THE APPROPRIATION COMMITTEE.

After further discussion by Messrs. Palmer and Garfield, in favor of and by Messrs. Connor and King, in opposition to its reference to a special committee, the vote was taken and the subject was referred to the Committee on Appropriations. The vote was subsequently taken in the House, and the action confirmed—105 to 98.

IN THE HOUSE.

The committee of the whole having reported to the House, the matter was laid before it by a motion referring the matter of Postal Telegraphs to a special committee.

The ayes and noes were called for by Mr. Farnsworth. When taken, it was found the reference first called for was carried by ten majority, the vote being 105 for a special committee to 95 against it. This is considered a decisive victory by the administration men, because a majority of the committee will be favorable to the measure.

The fight was a spirited affair from first to last.

FROM THE NEW YORK TIMES.

Mr. Creswell's two great schemes of a postal telegraph system and Post-office savings banks will, if approved by Congress, depend greatly for their success upon the early introduction of a comprehensive scheme of civil service reform. We cannot, in such matters, calculate upon achieving equal success with other countries, unless we are prepared to adopt similar precautions for securing efficient service. The Post-office must be free from the control of the politicians if it is to prove capable of working out schemes truly national both in magnitude and importance. A splendid chance is presented by the proposed postal telegraph system for giving female labor a new field. In Great Britain lady operators are the rule; and, with the exception of a slight confusion at first, the plan has worked admirably.

FROM THE NEW YORK TRIBUNE.

We dissent most emphatically from most of the President's suggestions based on the Post-master-General's Report. We deny that the expectation that the Post-Office should sustain itself is unreasonable. On the contrary, we hold that the Government should pay its own pastage, just as others do, and that those who use the Post-Office should sustain it—by a fair and equal assessment of the expense on those who are benefitted by it. Let everything transmitted through the Mails be fairly assessed to meet

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this expense; then, if three cents per letter does not pay, charge four or even five. But don't burden the Mails with thousands of tuns of free matter, and then make a parade of supporting the Department from the Federal Treasury. The system is every way vicious; and we are greived and amazed that the President still clings to it. Rip Van Winkle's twenty-years' sleep is a flea-bite to his.

Then as to "uniting the Telegraphic system of the United States with the Postal system," can the President be unaware that this means buying out the present stockholders in telegraphs at treble the cost of constructing the existing lines, and thus enriching a small number at the expense of the great body of their fellow-citizens? Thirty Millions are to be taken out of the Treasury by it to pay for property that never cost Ten Millions; and not one dollar of that Thirty Millions will ever come back again. Indeed, you tell us that the proposed system would "secure the further advantage of extending the Telegraph through portions of the country *where private enterprise will not construct it*" Not a doubt of it? Only throw the cost of extending and maintaining the Telegraph on those who don't use it, and we can have poles and wires, offices and batteries, superintendents and operators, where there is no business, and probably never will be. But, until the Post-Office is made to pay its own way, we insist that it shall let the telegraph alone. Nor will Congress vote otherwise, unless the members are plied with other than legitimate inducements to go wrong.

Of Mr. Creswell's scheme for placing the telegraphs under Government control we have spoken elsewhere. It is a mischievous plan, which we believe the good sense of the country will reject. Returns are cited of the great increase in the number of messages transmitted over British wires since they were united with the Post-Office Department; but the increase results from the reduction in tolls, and not from the change of management. Mr. Creswell could increase the consumption of bread if he would buy up all the bakeries and sell loaves at half price.

RAILROAD ITEMS.

From the Railway Gazette.

International of Texas.—The Houston *Times*, of the 16th ult., says that this road was then completed 46 miles east and four miles west of the point where it crosses the Houston & Texas Central, and is excellently constructed.

Fremont & Sandusky.—A Company with this name filed articles of incorporation with the Secretary of State of Ohio, November 16. It proposes to construct a railroad from Fremont, Ohio, through the counties of Sandusky and Erie to the city of Sandusky.

Southern Pacific.—This railroad, which now extends from Shreveport, La., westward through Marshall, Texas, 66 miles, is now the property of the Texas Pacific Company. The Shreveport *Gazette* says that it is now making a survey for a branch from Marshall, 42 miles west of Shreveport, nearly due north to Jefferson, Texas, about fifteen miles.

Burlington, Cedar Rapids & Minnesota.—This Company has commenced grading a branch line which will extend from Cedar Rapids nearly due north to West Union, Iowa, and thence northeast to a connection with Milwaukee & St. Paul at Postville.

St. Louis & Iron Mountain.—This Company's Arkansas Branch is now completed to Piedmont, 127 miles south of St. Louis and 50 miles north of the Arkansas border, and eighteen miles south of the recent terminus at Annapolis. Forty miles have been constructed this season (from Pilot Knob south), and most of the way through a difficult country.

The San Francisco *Chronicle*, of November 9, says: "The Central Pacific Railroad Company are now operating fourteen hundred miles of railroad, and are rapidly extending their lines in various directions. The San Joaquin Valley Branch, for which a subsidy was asked at the last session of the Legislature, is being extended southerly from Lathrop to Bear Creek, a point distant only 90 miles from Visalia, Tulare county."

Memphis & Little Rock.—The Pine Bluff (Ark.) *Republican* says that a contract has been executed in the sum of $2,000,000, providing for the immediate construction of the Pine Bluff Branch of the Memphis & Little Rock Railroad.

Montgomery & Eufaula.—This railroad is now completed from Montgomery, Ala., southeast to Eufaula, over the Chattahoochee River, a distance of eighty miles. Forty miles of it, from Union Springs to Eufaula, has been constructed this season. At Eufaula it connects with the Southwestern Railroad of Georgia, for Macon, Augusta, Savannah and the North, and where the western terminus of the Brunswick & Albany road will be.

Ulster & Ironton.—The Ironton (Mo.) *Enterprise* says: "We have a report that a thoroughly reliable company has been organized and the funds secured for building a railroad form Ironton to St. Mary's Landing on the Mississippi River, opposite Chester, Illinois. The length of road to that place would be about 45 miles, and would be the shortest which could be found to connect our mineral region with the coal fields of Illinois.

The *Courier* says: "The stock of this road has all been taken by English capitalists. The bankers in London will be Messrs. Blisschoffchein & Goldschmidt; Duncan & Sherman, of New York, will do the general banking business on this side of the water."

Erie & Genesee Valley.—This railroad is now completed from Mount Morris, in Livingston county, N. Y., southeast 24 miles to Dansville. The Erie Railway Company has leased it.

Pennsylvania Petroleum Railroad.—The Titusville *Courier* announces the letting of the contract for the construction of this railroad from Tidioute westward to Cambridge, Penn., about 40 miles, to Belden & Co., of Syracuse, N. Y. The route is from Tidioute, on the Oil Creek & Allegheny River Railroad, 38 miles northeast of Oil City a little south of west by way of Enterprise to Titusville, and thence northwest to Cambridge, which is a station on the Atlantic & Great Western road, 14 miles north of Meadville. A branch from Enterprise southward through Pleasantville and Shamburg to Pithole, 10 miles, is also let. It reports that an extension from Cambridge north to Erie, about 30 miles, will be let soon.

Marysville & Lexington.—This railroad is now in operation from Marysville, Ky., southwest to Carlisle, very soon will be completed to Millersburg, and in a very short time to Paris, Ky., thus opening a new route from the Ohio River to the famous blue grass region of Central Kentucky.

A survey is in progress for a railroad to commence at a point on the California Pacific, about ten miles north of Vallejo, thence crossing Napa Creek, near Green Island, skirting the salt marsh and crossing Petaluma Creek south of Donahue; thence *via* San Rafael to Saucelito.

TELEGRAPH LINES REPAIRED.

The telegraph line between Las Tunas and Santiago de Cuba, which for a long time has been interrupted by the Cuban insurgents, will be in working order again in a few days. The line between Las Tunas and Gibara, via Holguin, is already repaired and in working order. The line from Puerto Principe to Guayamara is nearly finished. The fact that these telegraph lines have remained undisturbed after being once placed in working order, is considered positive proof of the decline of the rebellion.

We are pleased to record the marriage of our good friend Robert Stewart, Telegraph Superintendent of the lines of the Camden and Amboy Railroad Co., to Mrs. Mary Cook, of Orange, N. J. The marriage ceremony was performed by Rev. N. Pettit, at Orange, Thursday, Dec. 7th, and we had the pleasure soon after of congratulating the happy couple at the Metropolitan Hotel, New York. We wish them abundant joy.

Springfield, Ill., Nov. 25, 1871.

To the Editor of the Journal of the Telegraph:

Dear Sir:—Your issue of Nov. 15 foreshadows a radical change in the tariff. A step that will eminently prove to be in the right direction, because *it tends to fix in the public mind, a definite idea of the cost of telegraphing.*

The masses of the people are but casual patrons of the telegraph. Under the present tariff system an individual telegraphs to-day, and may be again next week, or next month, by which time he will have forgotten the price he had previously paid. For these reasons the reductions of tariff made and making are not seen and are, therefore, not appreciated; except by those persons to whom the telegraph is a daily specific necesssity. This latter class is a small percentage of the aggregate community.

The number of messages transmitted yearly are several millions. It seems large, but on a little reflection it can be seen that it is comparatively insignificant. Assuming for instance that it is fifteen millions, and that the population of the country is forty millions: the average to each head will not reach three messages per annum.

Is there not room here for a vast enlargement of the business? Uniform, cheap rates will do it.

At present probably fully nine-tenths of the messages transmitted are *business* messages. The *social* element of the country has scarcely been touched. And here let me make a suggestion toward developing this social element, and I will have done with this communication:

Adopt a five-word base at half rates—messages over five and under ten words to remain as they are. Very little business, I opine, could be transacted within five words; and yet they would prove sufficient to express much pertaining to the weal or woe of a man's family. Yours, truly,

W. W. Kelchner.

Note.—We welcome all communications, especially those which come from experienced and intelligent managers. We cannot agree with our good friend Kelchner, respecting the use of a five-word rate. A large number of commercial messages are very brief, although the average of all messages is over thirteen words. To invite business by reducing the word standard seems in the inverse direction of true policy.

Paterson, N. J., Dec. 12, 1871.

To the Editor of the Journal of the Telegraph:

Will you please tell me, can a ground be tested on a circuit eight miles (or less) in length, and how?

Also please mention some good works on testing grounds, crosses, escapes, &c., and much oblige,

Yours respectfully, A Plug.

By "testing a ground," we suppose "locating" a ground is meant. This is becoming a familiar and easy process. "Pope's Manual" gives the usual modes of testing in such cases, and is sufficiently complete to answer all "A Plug" can desire.

Internal Resistance of Voltaic Batteries.—W. Betz, by the use of a compensating battery, has obtained and compared the resistances and electro-motive forces of various hydro-electric elements with great exactitude; and from those data has calculated the electro-motive force of various arrangements of voltaic batteries. Thus, taking a cell Daniell's battery as 1, the electro-motive force would be, according to his data:

1 Bunsen	= 1·799	Daniell
1 Grove	= 1·684	"
1 Stoehrer	= 1·272	"
1 Leclanche	= 1·167	"
1 Meidinger	= 0·849	"

—Poggendorff Annalen.

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STAMP FRANKS.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
New York, November 17, 1871.

Executive Order, No. 133.

INSTRUCTIONS FOR THE USE OF STAMP FRANKS.

The conditions printed on the cover of each of these Franks are as follows:

CONDITIONS.

"This Frank is intended to cover only the personal and private messages of the holder and answers thereto. It is not designed for business or political communications.

"A stamp must be affixed to every message containing twenty words or less, not including address, date or signature, and an additional stamp for every additional twenty words or less.

"If the sender desires to have an answer returned free, he may Frank it by affixing to his message the stamps required under the above rule.

"The holder of this Frank, by accepting and using it, assumes all risks, and agrees that the Telegraph Company shall not be liable for damages, whether from negligence of Agents or from whatever cause arising."

INSTRUCTIONS TO MANAGERS.

The stamps are inclosed in covers, on which are inscribed the name of the person to whom the Frank is issued, and the territorial limits within which it should be used.

Each stamp bears the number of the book inclosing it, and all stamps issued to the same person during the year, will bear the same number.

Receiving Clerks should satisfy themselves, if possible, by inspection of the book, or otherwise, that stamped messages are signed by or addressed to the party to whom the Frank was issued. But they have no discretion to refuse a message when properly stamped, unless they have reason to believe that neither the address nor the signature is that of the Frankholder. A stamp is conclusive, unless there is evidence to the contrary.

It is proper, however, to call the attention of the customer to any violation of the conditions, in respect to territorial limits, or to the business character of the message offered. Gross abuses of privilege should be at once reported to the Superintendent.

Anything in Executive Order, No. 119, conflicting with the above, is hereby revoked.

WILLIAM ORTON, President.

After quoting Mr. Orton's letter, the *Evening Mail* remarks: "We always thought that the Western Union was managed with as much shrewdness and practical wisdom as any other company in the country. We are confirmed in our opinion."

THE plan of the Titusville *Herald* to find oil fields won't do. The earth is a great conductor, and the intervention of a petroleum lake between two points would make no obstruction, so long as there remained masses of moist earth round them. The conductor being infinitely large, the minor obstruction could not be perceived. Were both the terminal plates by some lucky chance immersed in the same oil pool, if petroleum be proven to be a non-conductor, the result might be apparent. Petroleum is a good conductor.

THE POSTAL TELEGRAPH SCHEME.

The President's recommendation to add the telegraph service to the functions of the national government has surprised the country. Public opinion condemns the project without hesitation and with remarkable unanimity. We have yet to hear any important expression in its favor.

It is evident that President Grant regards the condition of the national civil service with a complacency not shared by other citizens of the country, if he can conscientiously recommend so important an extension of its functions. For a long time the people have been demanding reforms in this department of the government. The people might very fairly respond to the recommendation of their chief magistrate in these words: "When, by a proper use of your ample powers, you have rendered the civil service something better than an instrument of political influence, it will be time enough to urge this vast extension of its powers."

But even if our civil service were in a condition less deplorable than it is, there would be strong objections to an assumption by the government of the telegraphic business of the country. It has become a principle of political science, deduced by costly experience, that governments, lacking the spur of private interests, are wasteful and inefficient agents in conducting business. Therefore they should be strictly limited to functions which private enterprise cannot perform, or which, for political reasons, should not be entrusted to individuals. The necessity of this rule is less when a well-organized civil service exists; but with that department of our government in its present condition, or in any condition it is likely to reach for a number of years, the strict limitation of the duties of government should be insisted upon.

The power of controlling and directing public opinion and action in any important crisis, which an exclusive possession of telegraphic communications would afford, would strongly tempt public officers (already too willing to adopt doubtful methods in politics) to suppress intelligence or even temporarily to deceive the people for partisan purposes. Until the American standard of official integrity and self-respect be greatly elevated; until sharp practices are less frequent in our politics, the people cannot safely make the government the purveyor of their information.

Nor is there any reason to increase the occupations and responsibilities of our government by the proposed measure, unless it appears that the private organizations now owning and managing the telegraph lines are incompetent or untrustworthy. This is not alleged by the advocates of the scheme. It is not for the remedy of existing evils, but in the hope of securing certain additional advantages, that the project is urged. Among these, at once the most desirable and the most doubtful, is greater cheapness in the transmission of messages. The government would undoubtedly reduce the rates. But such a reduction would not necessarily lessen the cost of the telegraph system to the people. The funds necessary to maintain the telegraph lines, if not raised from tolls, must be realized by taxation, as in the case of the Post Office Department.—*N. Y. Evg. Post.*

OFFICERS.—A meeting of the Telegraph Snow Shoe Club was held the other night for the purpose of electing officers for the ensuing season. The following gentlemen were elected officers:—Mr. J. Dakers, Hon. President; Mr. Angus Grant, President; Mr. W. Bowman, Vice-President; Mr. W. Mathews, Secretary and Treasurer; Messrs. McIntyre, J. Cochrane and W. Wilson, Committee. The Club commenced its weekly tramps on Friday night, December 1.—*Montreal paper.*

LELAND'S GALVANIC BATTERY.

This invention has for its object to produce an electric battery which will operate continuously without requiring attention, as long as it remains provided with the requisite exciting substances. The invention consists in placing within the porous cup, containing the platinum element, sulphate of mercury alone or mixed with black oxide of manganese, and in surrounding the cup with water, which is in contact with the zinc, This combination, it is claimed, produces reliable action, and is very economical, as the spent sulphate of mercury falls to the bottom of the cup in a shape to be readily reconverted.

The inventor states that, by connecting the poles of the platinum and zinc plates, a steady action is maintained until the sulphate of mercury is entirely decomposed and falls to the bottom of the cup as metallic mercury, ready to be reconverted into sulphate of mercury. This insures great economy.

This battery will, it is claimed, work weeks or months without attention, except perhaps the filling up of evaporated water, and the supply of sulphate of mercury. No acid being required, offensive fumes are avoided, and much steadier action is insured.

The improvement is the invention of Mr. Edwin J. Leland, of Worcester, Mass.

THE correlation of vital and physical forces continues to be a subject for phylosophical research; and among points of interest, there is none more interesting than that which relates to thought and its manifestations. It is evident, say the investigators, that the mechanism for the production of deep thought, effects the conversion of energy far more perfectly than that which produces simply emotion, When a thought is expressed by some outward action, there is a less development of heat than in contrary cases—that is, when no muscular movement takes place. Experiment has shewn that the amount of heat developed by the recitation to one's self of emotional poetry, is in every case less when the recitation is oral—that is, muscular expression. This accords with the well-known fact, that emotion often finds relief in physical demonstrations, which diminish the emotional energy by converting it into muscular.

On this question, Professor Barker, of Yale College, remarks: 'Chemistry teaches us that thought-force, like muscle-force, comes from the food; and demonstrates that the force evolved by the brain, like that produced by the muscle, comes not from the disintegration of its own tissue, but is the converted energy of burning carbon. Can we longer doubt,' he adds, 'that the brain is a machine for the conversion of energy? Can we refuse to believe that even thought is, in some mysterious way, correlated to the other natural forces, notwithstanding that it has never yet been measured.'

IN brief dispatches intimations of a strike among the telegraph operators of Great Britain are given. The cause, so far, is not named, but the strike is a failure.

A CARD.

I take this method to express my most grateful and heartfelt acknowledgements to the many friends who so signally manifested their kindness and regard for me, in the presentation of a generous purse, containing upwards of two hundred dollars, contributed by operators of Boston office, operators, officers and employes of Providence and Worcester road, and citizens of Uxbridge. I would also return thanks for the many favors administered by the hand of friendship, which did so much to alleviate the suffering and dispel the gloom of the sick room.

LUCELLA W. STONE, Telegraph Operator.
Uxbridge, Nov. 28, 1871.

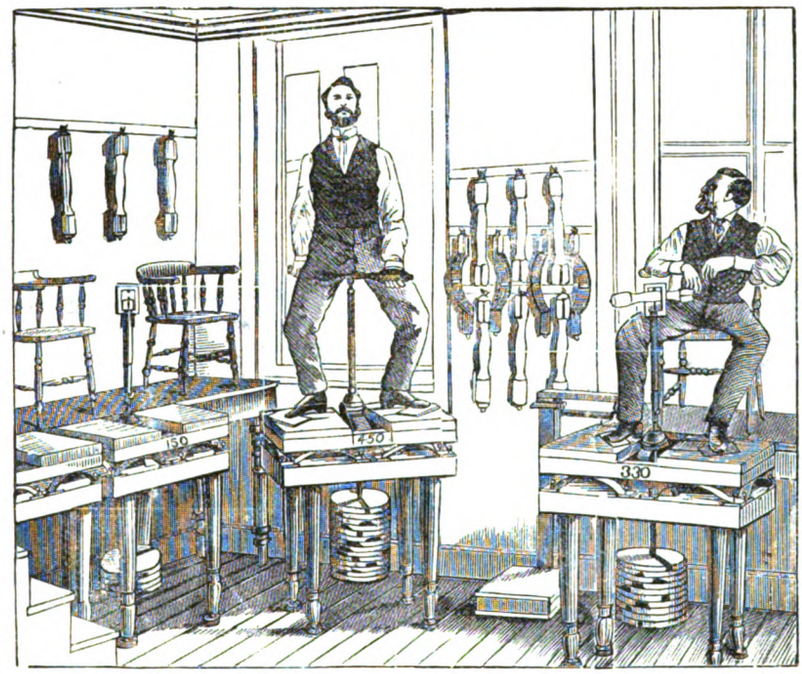
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FAMILIAR TELEGRAPH TALKS.

HEALTH OF OPERATORS.

This subject is scarcely in the order we designed it to occupy. Yet, because of others, we now give it. It may seem out of due range. We would however, be remiss to what we conceive to be a duty, did we omit to convey intelligence respecting anything which can, in the least degree, confer substantial benefit or pleasure upon any of our readers. We conceive it the duty, and ought to be the instinctive pleasure of every one, to use the experiences of his life which have been to him fruitful of health to brain or body, so that his fellows can share their benefits.

An article we wrote several weeks ago respecting the lift cure, has brought to us considerable correspondence and inquiry. To most of these we are unable to reply by letter, and we, therefore, prepose to do so by giving all the information within our power so that all can have it. We shall also give the story of our own experience with this caution. We were probably in the physical condition which made this process the very thing adapted to us. Let nobody think that lifting is going to give him immortal youth, or will atone for neglect of the body in food, clothing and rest. However here is our story :



Towards the middle of September we found ourself in a state of health which could not be called sickness, in which food was acceptable though not greatly desired, the power to sleep moderate, yet the action of the body irregular, and its vitality low. The feeling of power was absent. There was no resistance, no flash, no force, no vim. The hot Scotch blood had lost its fire. We were discouraged, weak, broken. Nothing seemed before us but retirement from our duties and an effort to regain lost power by dropping every care and forsaking all toil. Nay, it sometimes flashed across us that life's rubicon had been passed, and that in a series of gradual settings we would soon reach the rest for the weary, and, beneath the daisies, sleep. Even that had its lustre, and worse things happen to men than to have the green earth blossoming above them. Yet we had a dislike to leave, and thought that, little as we might be thought of or needed, we would like to stay a little longer.

One evening, having left the office, the sense of weariness was painfully present. The distance to our home seemed vast and far. There came, we confess it, a tear upon our cheek, a token of utter exhaustion, and we stood for a few moments on the sidewalk a prey to its power.

In the block below us, there is what is called the "Butler Lift Cure" of which we had heard, but which we had regarded as some long haired man's notion, and to which we gave no concern. Impelled now, however, by our condition, we ascended to the room, and entered into conversation with the principal respecting the process. On his recomendation we ascended the platform and lifted consecutively 120, 130, 140 and 150 lbs., by an arrangement which the cut given will convey a correct idea. In no other attitude could we possibly have lifted so much. It was the very extent of our capacity. After reclining on a lounge a few minutes we started for home. It is no exaggeration to say that on regaining the street our sense of exhaustion had entirely left us, not the slightest sense of fatigue accompanying us on our way home. Here seemed something wonderful. It was noticed the instant we met our household. Brightness had come to the eye, and elasticity to the step. We found too that we could laugh, and supper tasted like a beatitude. We are not romancing a particle.

Since then we have spent a half hour each day in this way greatly to our benefit. It has brought into exercise the entire body. Headache, pains in the eyes, weariness in the breast, torpidity of liver, irregular action of the bowels have one by one disappeared. We have just returned from lifting 350 lbs., and feel as if we had just arisen from refreshing sleep. All this to us is simply wonderful. The deep lines in our face have disappeared. Our friends recognize the change, and the members of the Telegraphers Mutual Life Insurance Association are relieved from the near propect of an assessment for the benefit of our heirs.

It is asked how we proceed. We will tell you :

1. Two lifts at short intervals of a comparatively light weight, say 120 lbs., the body while lifting being preserved strictly straight, the breast well out. It is an ease in lifting to first inhale a full breath, and, for a time, retain it. For heavier lifts this is essential, and much aids the invigoration of the body, expanding the lungs, and bringing all parts of the body into exercise in the act of lifting.

2. After a short rest, two lifts of say 140 lbs. each. Succeeding these, complete rest upon a lounge, with head low, for about five minutes, is practiced to allow reaction, and the quieting of the body.

3. Two lifts follow, of say 160 lbs. each, followed by maximum lifts of say 175 lbs., and succeeded by a rest of the extended body on a lounge for about 10 minutes. These weights to be gradually increased, say five pounds daily, so long as they can be lifted without oppression.

So far as we can discover, the exercise of the body in these lifts is complete and uniform. Gentlemen far advanced in years we find each day enjoying its invigorating effects, and many young men also practice it, who credit it with restored health and prolonged life.

The cost of a complete "Butler Lift Cure" apparatus and weights is $200, and can be had in a modified form as low as $50. Of these modified forms we have no knowledge.

There is another method of lift which we think better adapted to the use of offices than the one described, only, however, because of its being without weights, easy of change from one power to another, and of a price which, in the case of large offices, is quite within the means of those connected therewith. It is supplied with two handles, to be lifted as one would lift a wheelbarrow. This renders it suitable for ladies. By standing on a small platform and lifting at the handles, one raises his own body, and the amount of lift is arranged by an adjusting yoke, easily changed. Price $80.

In this exercise there is complete action given, in a quiet and careful manner, to the whole body. It requires only a few minutes daily, and, we believe, largely conserves health.

RAILROAD WIRES.

THEIR USES AND THEIR ABUSES.

Every road now has its train dispatcher, and where there are two or more wires, one of them is especially devoted to train work. Some of our roads, however, have but a single wire, and over this wire must pass the telegraph company's business, as well as that of the road. Others again have two, three, and four wires, following the track, while, perhaps, more than half the officers on the line have only one instrument, and this instrument is of necessity kept on the train wire. So, in either case, the railroad wire is demanded more or less for the transmission of paid business; and if a proper economy in its use be exercised by the train dispatcher—who usually has charge of the circuit—the business of neither corporation need suffer any serious delays. It is right here that we wish to point out one of the abuses of railroad wires—a very common abuse, though one not wholly unexceptive. We refer to the manner of sending train orders as it is generally done. A telegraph order giving a certain train the right to the road ahead of, or against another train, must of course be sent to the conductors of both the interested trains. But instead of making one order answer for the two trains, and calling up both officers and having them copy at the same time, it is customary first to send an order to the train against which the time is given, and then to send another order to the train in whose favor the special arrangement is made, thus occupying the wire just doubly as long as there is any necessity for. A great many of our railroad operators are also station agents, or have other duties to perform, and as a class they are not skillful in the Morse profession, hence, working with them is often slow and tedious, and on roads where from twenty to fifty train orders are issued daily, the time consumed by such useless repetitions ought to be saved in the interest of other business. We say this abuse is not wholly unexceptive. We can point to roads that have long since abandoned, if indeed they ever adopted, this primitive usage, and one such road, at least, is running at the present time not less than one hundred trains daily, most of them over a single track. They find one wire more than sufficient for train work. This would not be possible did they transmit every order twice.

OBSERVER.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JAMES D. REID, Editor,
Executive Rooms, Western Union Tel. Co.,
145 Broadway, New York.

NEW YORK, DECEMBER 15, 1871.

THE POSTAL TELEGRAPH.

One of the most prominent of the measures of the administration recommended to Congress, both by the President and the Postmaster General, as will be seen by our published congressional proceedings, is the establishment of the European system of Postal Telegraphs, as a part of our governmental system. It will be urged and opposed with equal vehemence. Its discussion has already given a chance to vent as much mis-statement of fact and false assumption as have heretofore attended it. To one of these we find the following official denial:

"NEW YORK, Dec. 6, 1871

"Hon. JAMES B. BECK, M. C., Washington:

"You are reported in the morning papers as having stated in the House yesterday that, whereas the Western Union Company had opposed the assumption of the telegraph by the government before the last Congress, you understood it to have changed its position and to be now anxious for it. Permit me to assure you that you have been misinformed. The Western Union Company is inflexibly opposed to any interference of the government with their business. A meeting of the Board of Directors was held this morning, which was largely attended, and a resolution was unanimously passed protesting against the right and the policy of any acquisition of their property and rights by the government. A committee, consisting of Mr. Horace F. Clark, Mr. A. B. Cornell, Mr. Edwin D. Morgan, Mr. Moses Taylor and myself, were appointed to prepare and send to Washington a protest against the suggested action of the government, and to claim its protection against interference and against the policy of the establishment of competitive enterprises."

WILLIAM ORTON, President.

To misrepresentations respecting the value of the lines and the schemes of their owners, it would be waste of time and space to allude. We reprint an extract from Herbert Spencer, which we regard as the vital argument in the whole case.

Herbert Spencer says: "While representative government is, by its intrinsic nature, better than any other for administering justice or insuring equitable relations of citizens to each other, *it is, by its intrinsic nature, worse than any other for all the various additional functions which governments commonly undertake.* To the question, 'What is representative government good for?' our reply was, 'It is good, especially good, good above all others, for doing the thing which a government *should* do. It is bad, especially bad, bad above all others, for doing the things which a government should *not* do.'

"To this truth we may add a correlative one. As fast as a government, by becoming representative, grows better fitted for maintaining the rights of citizens, it grows not only unfitted for other purposes, but dangerous for other purposes. In gaining adaption for the essential functions of a government, it loses such adaption as it had for other functions, not only because its complexity is a hindrance to administrative action, but also because, in discharging other functions, it must be mischievously influenced by class bias. So long as it is confined to the duty of preventing the aggressions of individuals on each other, and protecting the nation at large against external enemies, the wider its basis the better; for all men are similarly interested in the security of life, property, and freedom to exercise the faculties. But let it undertake to bring home positive benefits to citizens, or to interfere with any of the special relations between class and class, and there necessarily enters an incentive to injustice. Therefore do we say that *as fast as representation is extended, the sphere of government must be contracted.*"

These sentiments are our own. We believe in the old democratic motto, "That government is best which governs least." We protest against an interference with popular enterprise which must, in the nature of things, injure both government and people. Especially do we resist that which, if assented to, would be an admission that the purity of representative government is less dear to us than the mere cheapening of a commodity which, by the pressure of public opinion, the general relation of other values, and an intelligent management, sooner or later finds its true status and limitation.

AT the regular semi-annual meeting of the Board of the Western Union Telegraph Co., held December 6th, Geo. H. Mumford, Esq., Secretary, was unanimously elected Vice-President. It is a post requiring much tact, and of great labor, to which Mr. Mumford brings a sound constitution and ample ability.

In a meagre and unsatisfactory message, via Jamaica, the restoration of the lost or broken cable between Jamaica and Porto Rico is reported to have been effected, although telegraphic communication thereby "cannot be opened until the arrival of the cable steamer International from London," supposably from the necessity of material or additional cable to make the connection complete, or to repair a new break which is reported 28 miles from Porto Rico.

With the knowledge that an unsuccessful attempt had been made to connect the Porto Rico cable with St. Domingo, in which the main cable was broken, we are led to regard the dispatch from Jamaica as referring to this break and not to one near Porto Rico. Shore cable is needed to make the contemplated loop with St. Domingo, which the International probably bears.

There now seems some promise of an early telegraphic communication with South America, and with the large family of islands which form the curiously arranged stepping-stones of the Indian Ocean between Cuba and Venezuela, unless new misfortunes attend this unfortunate enterprise. Connection with the telegraph systems of South America will, of course, soon follow the successful connection with Porto Rico.

We have before us the report of the West India and Panama Cable Co., for the the year ending, September 30, 1871. Of the capital of £650,000, there has been issued:

	£	s.	d.
Sales of Stock	571,910	0	0
Debenture Bonds issued	27,000	0	0
Paid up Shares held against contractors	78,090	0	0

The expenditures of all kinds up to the date of the report, including £37,874, the cost of the unfortunate steamer Suffolk amounts to £609,650 14s. 2d.

The operation of the cables successfully laid had, so far, left a deficit of £983 6s. 3d., which, with the limited range of communication, and a high tariff, bitterly complained of by the population, is not to be wondered at.

The cables which have been successfully laid connect Porto Rico, St. Thomas, St. Kitts, Antigua Guadeloupe, Dominica, Martinique, St. Lucia, St. Vincent, Barbadoes, Grenada, Trinidad and thence to Georgetown, Demerara, whence the land line is completed to Berbice. The land lines in Trinidad are in working order and those in Guadeloupe are reported as almost complete.

The cable between Jamaica and Panama remains broken in Latitude 14, 12 N, Longitude 77, 45 W; over 300 miles additional cable is required to complete this connection with Jamaica, provided the cable already down is recovered.

The Directors make the following statement to the shareholders:

"The Directors cannot help expressing the very great regret they feel that the Contractors have so long failed to complete their contract. The difficulty in which the Directors are placed, owing to the present incomplete state of the Company's Submarine Telegraph system, is enhanced by the fact that it accidentally came to their knowledge in April last, that Sir Charles Bright, whose services as Engineer of the Company they had thought themselves fortunate in securing, *had accepted the position of sub-contractor for laying the cable.* As soon as this came to the knowledge of the Directors, they acquainted Sir Charles Bright of their having been advised that his office as Engineer *became vacant from the date of the sub-contract.*" They add:

"It is at present injudicious to point out the course which your Directors will have to pursue to protect your interests. They trust the Contractors will soon fulfil their contract, and that no difficulty will be made by them in making due reparation for the losses this Company has sustained."

It thus appears that although the contract was originally made with the India Rubber Telegraph Works Company, it practically fell into the hands of private parties, to which we formerly alluded, or, what is more strictly correct, perhaps became partners in the undertaking. This is confirmed by the fact that Sir Charles Bright, at the meeting of shareholders, held in London, Nov. 22, denies that he acted with the contractors without the knowledge of the Directory. Whoever the sub-contractors are, it seems impossible but that large loss must have attended the undertaking. The cost of steamers waiting, with banked fires, week after week, and month after month, for lulls of weather to attempt the restoration of cables, inadequate vessels, one of which, the "Suffolk," was an old blockade runner, bought cheap and fitted for cable service, all intimate a heavy damage to the contracting parties. The "Suffolk" which was leased to Sir Charles Bright, for £3,000, for an unlimited time, is now on her way to Key West to recommence her work.

We yet hope for ultimate success. The cable-makers, we are told, have a majority of the stock.

Rear Admiral Hugh Dunlop, C. B., has been appointed commissioner to investigate the causes of delay in laying the cables.

The *Standard*, London, Nov. 24, 1871.—It is understood that the recent advance in the shares of the TELEGRAPH CONSTRUCTION COMPANY has been occasioned by the arrangements in progress for securing the contract of the new Brazilian cable direct from the government. In addition, it is known that projects are in contemplation for further Atlantic cables, so that the service may always be kept up without the slightest interruption.

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TRANSFER SERVICE.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
New York, December 6, 1871.

CIRCULAR TO TRANSFER AGENTS.

On the 31st December inst., at the close of business, all Cipher B books and sheets now in use by Transfer Agents and Offices, will be cancelled and annulled and a new set of books and sheets substituted in lieu thereof.

You will receive, herewith, a new book for your use on and after the 1st January, 1872, containing your Cipher B sheets, with all other Transfer Agents, and with all Transfer Offices in your District. You will also receive loose sheets, intended for the new Cipher B sheets of the Transfer Offices in your District, and to be forwarded to the Managers of such Offices as hereafter directed.

These sheets are all numbered and are duplicates of the pages referred to in the index of your book opposite the names of the offices—For example: Opposite the name Ashland is set the figures 51, which indicates that page 51 represents the Cipher B sheet of the Ashland office; you will therefore forward *the loose sheet numbered* 51 to the Ashland manager, with directions to use the same as his Cipher B sheet, from and after the 1st January, 1872, and to return his old Cipher B sheet to you at the close of business on December 31st; so with all other Transfer Offices in your District. You will observe from the index of your Cipher Book, that two pages instead of one, have been assigned to each Transfer Agent for his Cipher B sheets with all other Transfer Agents—one page to be used in *sending* and the other in *receiving* transfer messages.

For example: In sending a transfer message to another Agent, you ascertain the proper Cipher B word to be used therein, by reference to the page specified in the "*send*" column of the index opposite the Agent's name—and in receiving a transfer message from another Agent, you verify the Cipher B word used therein, by reference to the page in the "*receive*" column of the index, opposite the Agent's name.

In the old cipher books only the first thirty pages correspond in all books, but in the new cipher books *all* the pages correspond in all books, so that whenever the cipher words, either on a "*sending*" or a "*receiving*" Cipher B sheet, between two Transfer Agents, have been nearly all exhausted, the two Transfer Agents interested can agree upon and substitute any other unappropriated page in the book to be used in place of the old one, for sending or receiving, as the case may be.

If any Transfer Agent should deem it desirable, he may appropriate two pages—one for sending and one for receiving—for use between himself and any office in his district doing a large amount of business; but as a general rule, one sheet will be found enough between Transfer Agents and their Offices for both sending and receiving transfer messages.

Whenever all the pages in a cipher book have been appropriated, the Transfer Agent will make application for another book, which will be furnished him from this office.

No change whatever, is contemplated in the general or special cipher instructions now in force.

Transfer Agents will acknowledge, by telegraph, the receipt of new cipher books and sheets, and will return their old cipher books and sheets to this office as soon as practicable, after the new ones have gone into operation.

GEO. H. MUMFORD, Vice President.

From the recent official reports to the Mexican Congress, the following statistics of the railroads and telegraphs of that country are taken:

RAILROADS.	Length. Kilometers.	Meters.
From Mexico to Puebla	186	278
Vera Cruz to Paso del Mosho	75	...
Vera Cruz to Loma Alta	35	...
Vera Cruz to Medillin	12	...
Mexico to Tacubaya	8	...
Mexico to Tlalpan	24	250
Mexico to Guadaloupe	6	700
	347	228

Or 216 miles.

LINES OF TELEGRAPH.	Length. Kilometers.	Meters.
From Mexico to Cuervanaca	83	800
Mexico to Toluco	67	40
San Luis to Zacatecas	184	360
Zacatecas to Durango	54	470
Tehuacan to Oaxaca	272	350
Vera Cruz to Tampico	288	500
Mexico to Vera Cruz, Tehuacan, Tlavcula and Tulancingo	1,047	500
Leon to Guadalajara and Manzanillo	646	260
	2,643	280

Or 1,642 miles.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
December 15, 1871.

Notice to Special Transfer Offices.

Amounts received at special transfer offices, for transfers of sums exceeding one hundred dollars, will hereafter be remitted direct to the Treasurer, in New York, in the same manner as they have been sent heretofore to the Transfer Agent at that office.

On and after 1st January, 1872, Mr. I. C. Hendrickson, of the New York office, will take charge of the Transfer Districts previously assigned to Mr. Horner and Mr. Holmes, and all transfers for offices in those districts and for special transfer offices will be addressed to him.

The following changes will be made in the list of transfer offices on same date.

NEW TRANSFER OFFICES OPENED.

Addison, N. Y.	I. C. Hendrickson
Ashland, Pa.	D. H. Bates
Abilene, Kas.	R. C. Clowry
Boonville, Mo.	"
Brownsville, Tex.	D. P. Shepherd
Charlottesville, Va.	J. R. Dowell
Chetopa, Kas.	R. C. Clowry
Columbia, Mo.	"
Clinton, Mo.	"
Corsicana, Tex.	D. P. Shepherd
Corpus Christi, Tex.	"
Evansville, Ind.	G. W. Trabue
Emporia, Kas.	R. C. Clowry
Franklin, La.	D. Flanery
Fort Laramie, Wy.	W. B. Hibbard
Grand Island, Neb.	"
Georgetown, Col.	"
Hazleton, Pa.	D. H. Bates
Humboldt, Kas.	R. C. Clowry
Holden, Mo.	"
Lake City, Fla.	J. A. Brenner
Lake Charles, La.	D. Flanery
Manchester, N. H.	G. W. Gates
Mahanoy City, Pa.	D. H. Bates
Moberly, Mo.	R. C. Clowry
Norristown, Pa.	D. H. Bates
North Platte, Neb.	W. B. Hibbard
Pittston, Pa.	D. H. Bates
Paola, Kas.	R. C. Clowry
Rockport, Tex.	D. P. Shepherd
Susquehanna, Pa.	I. C. Hendrickson
St. Johnsbury, Vt.	G. W. Gates
Saint Clair, Pa.	D. H. Bates
Tamaqua, Pa.	"
W. R. Junction, Vt.	G. W. Gates
Waverly, N. Y.	I. C. Hendrickson
Warrensburg, Mo.	R. C. Clowry
Weston, Mo.	"

TRANSFER OFFICES CLOSED.

Catskill, N. Y.	John Horner
Cambridgeport, Mass.	C. F. Wood
Charlestown, Mass.	"
Hopkinsville, Ky.	G. W. Trabue
Jesup, Ga.	J. A. Brenner
Kosse, Tex.	D. P. Shepherd
Lavacca, Tex.	"
Roxbury, Mass.	C. F. Wood
Sing Sing, N. Y.	John Horner
West Troy	"

ADDITION TO LIST OF SPECIAL TRANSFER OFFICES.

Washington, D. C.	I. C. Hendrickson

Transfer Agents of Districts in which the new offices are located, will forward to the managers of such offices, complete sets of the forms required for the service, which forms will be furnished them from this office on the usual requisition.

These forms should be forwarded, at least a week in advance of the first of January.

Managers of offices dropped from the list, should be required to return the money order forms in their possession, to their Transfer Agents, at the end of the year.

Each transfer office will be furnished with a printed and framed list of the money order offices of this Company, to be hung up in a conspicuous place in the office.

All requisitions for transfer blanks or books (ciphers excepted) will be made hereafter on the Supply Dept. at New York.

GEO. H. MUMFORD, Vice President.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
December 15, 1871.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since Dec. 1, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

	Aylesford, N. S., tariff same as Middleton, N. S.	378	Louisiana, Mo.
		242	New Hope, Ohio.
59	Abington, Montgom'y Co., Pa. Check Old York Road, Pa.	59	Old York Road, Pa., P. O. Adds. Shoemakertown, Pa.
		*	Okemos, Mich.
246	Ackworth, Ga., re-opened	137	Orient, "
231	Brooklyn, Mich.	*	Portland "
*	Brighton "	*	Pendleton, S. C.
319	Belle River, Ill.	130	Pine Grove, Warren Co., Pa.
138	Buchtel, Mich.		P.O.adds. Russelsburg, Pa.
139	Chautauqua, N. Y.		Rancho La Para, Texas, tariff same as Corpus Christi, Texas.
289	Colfax, Ind.		
220	Delhi, Mich.		
137	Evart, "	137	Reed City, Mich.
130	Frewsburg, N. Y.	3 31	Saline, "
59	Fort Washington, Pa., P. O. Adds. White Marsh, Pa., check Lansdale, Pa.	231	Somerset, "
		*	Sandy Creek, N. Y.
		59	Souder's Station, Pa.
159	Freedom, O.	59	Sellersville, Pa.
*	Fowlerville, Mich.	148	Sand Point, Mich., P. O. Adds. Au Gres, Mich.
*	Greenville, "		
*	Grand Ledge, "	465	Sabetha, Ks.
465	Hiawatha, Ks.	158	Seneca, Ks.
137	Hersey, Mich.	493	St. Mary, Texas.
*	Holmesville, Oswego Co., N. Y.	340	Toons, Tenn.
		446	Troy Junction, Ks.
*	Howell, Mich.		Tanque Carisitas, Texas, tariff same as Brownsville, Texas.
*	Howard, "		
	Idaho, Col., re-opened Tariff same as Central City, Col.	*	Union Square, N. Y.
59	Lansdale, Pa.	*	Wallhalla, S. C.
*	Lyons, Mich.	*	Williamstown, Mich.
290	Lyons, Ind., re-opened		

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.		*Leaves this Line.*
Holmesville, Oswego Co., N. Y.	30	2	Syracuse, N. Y.
Pendleton, S. C.	100	7	Columbia, S. C.
Sandy Creek, N. Y.	30	2	Syracuse, N. Y.
Union Square, N. Y.	30	2	" "
Wallhalla, S. C.	125	8	Columbia, S. C.
Brighton, Mich.	40	3	Detroit, Mich.
	50	3	Lansing, "
	60	4	Ionia, "
Fowlerville, Mich.	55	4	Detroit, "
	40	3	Lansing "
	55	4	Ionia. "
Grand Ledge, "	65	4	Detroit, "
	25	2	Lansing, "
	40	3	Ionia, "
Greenville, "	75	5	Detroit, "
	55	4	Lansing, "
	40	3	Ionia, "
Howard, "	85	6	Detroit, "
	65	4	Lansing, "
	50	3	Ionia, "
Howell, "	50	3	Detroit, "
	45	3	Lansing, "
	60	4	
Lyons, "	65	4	Detroit, "
	40	3	Lansing, "
	25	2	Ionia, "
Okemos, "	60	4	Detroit, "
	25	2	Lansing, "
	45	3	Ionia, "
Portland "	65	4	Detroit, "
	30	2	Lansing, "
	35	2	Ionia, "
Williamstown "	60	4	Detroit, "
	30	2	Lansing, "
	55	4	Ionia, "

OFFICES CLOSED.

Camp Stambaugh, Wy., Coal City, Pa., Ellicott City, Md., Mounds, Ill., Summerville, S. C., and South Pass, Wy.

GENERAL INFORMATION.

Hereafter, business for Pleasant Valley, Nanticoke and Newport, Luzerne Co., Pa., will be checked to, and same rate as Wilkesbarre, Pa.

Holmesville, N. Y., an Other Line office, given in JOURNAL of February 1, 1871, with "tariff for Other Lines," from Norwich, N. Y., is in Chenango Co., N. Y.

[OVER.

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Rancho La Para and Tanque Carisitas, Texas, are excepted from the night message "Half rate" system.

The following offices on the Alabama and Chattanooga Telegraph Line have been re-opened, with "tariff for Other Lines" from Chattanooga, Tenn., and Meridian, Miss.:

Atalla, Ala	100	7	Meridian, Miss.
	75	5	Chattanooga, Tenn.
Collinsville, Ala	100	7	Meridian, Miss.
	50	5	Chattanooga, Tenn.
Birmingham, Ala	100	7	Meridian, Miss.
	100	7	Chattanooga, Tenn.
Eutaw, Ala	75	5	Meridian, Miss.
	100	7	Chattanooga, Tenn.
Haysville, Ala	75	5	Meridian, Miss.
	100	7	Chattanooga, Tenn.
Livingston, Ala	50	5	Meridian, Miss.
	125	10	Chattanooga, Tenn.
Morganville, Ga	115	8	Meridian, Miss.
	50	5	Chattanooga, Tenn.
Springville, Ala	100	7	Meridian, Miss.
	75	5	Chattanooga, Tenn.
Trenton, Ga	110	7	Meridian, Miss.
	50	5	Chattanooga, Tenn.
Toomsuba, Miss	50	5	Meridian, Miss.
	125	10	Chattanooga, Tenn.
Wauhatchie, Tenn	115	8	Meridian, Miss.
	50	5	Chattanooga, Tenn.
Green Pond, Ala	100	7	Meridian, Miss.
	100	7	Chattanooga, Tenn.

OFFICES HAVING "SPECIAL SHEET A,"

Will hereafter check Brunswick, Ga., 25 cents more than "Special rate" to Savannah, Ga., and to Macon, Ga., same as "Special rate" to Savannah, Ga.

ATLANTIC CABLE BUSINESS.

Notice is given that the Shanghai and Nagasaki Cable is repaired, but the section from Hong Kong to Shanghai is now broken.

Messages for Shanghai, via Falmouth, must be addressed, "*Post Hong Kong.*" Rate as before to Hong Kong, $35, adding 38 cents for postage.

Messages for Nagasaki, via Falmouth, addressed, "*Post Hong Kong, telegraph forward,*" which words must be charged for, will be sent by cable from Shanghai. Rate is $40 for 20 words, and half rate for extra ten, or fraction of ten, with 38 cents added for postage from Hong Kong to Shanghai.

The communication with Nagasaki by Great Northern and Siberian lines is still open for messages specially addressed "*via Russia.*"

Telegraphic communication is now open with the following stations in the Shetland Islands:

Moss Bank in Mainland,
Culla Voe in Yell,
Uga Sound in Unst,
Balta Sound in Unst.

Rate from London:

50 cents for 20 words or less,
25 cents for each 10 or fraction of 10 words over 20.

The 10 word Continental rate to India, Aden and Persia, is abolished. The minimum charge is now for 20 words, for which the rate remains unchanged—viz:

From London—	*For 20 words or less:*
To Aden	$15 00
To India	22 50
To Farther India and Ceylon	23 50
To Persia, including Bashire	6 12

Half rates for each 10 words or fraction thereof over 20.

The words "via Teheran" will not henceforth be charged for beyond London.

WILLIAM ORTON, President.

CORRECTION.

Supt. W. A. L'Hommedieu's headquarters are at Monroe, La., instead of at Shreveport, La.

A number of items designed for this number are unavoidably omitted.

A cotemporary says the new word "cablegram" "knocks on the cover of the dictionary for admission."

THE price of the Morse Testimonial Monographs, packed on rollers and post-paid, is $1.25. The engrossers design leaving copies in our hands ready for mailing when orders are sent us, and to which we will gladly attend.

TELEGRAPHERS' MUTUAL LIFE INSURANCE.

ASSESSMENT NO. 23.

17	33	84	208	245	252	254	350	445	456	514
575	583	603	608	642	661	667	708	729	776	801
851	882	900	941	991	992	994	1044	1079	1105	1106
1107	1108	1109	1110	1111	1112	1113	1115	1119	1120	1121
1122	1123	1127	1130	1131	1136	1137	1168			

ASSESSMENT NO. 24.

8	13	16	17	25	26	30	31	39	41	49
67	74	75	82	84	86	89	91	98	108	111
122	143	146	158	178	179	208	209	213	218	230
238	242	243	245	247	252	254	258	267	294	298
316	347	350	367	379	398	402	414	429	435	437
445	451	453	455	457	466	467	468	469	470	471
474	475	482	514	532	588	597	603	604	608	617
618	642	661	667	679	694	702	704	708	717	729
735	766	771	776	801	848	851	878	882	904	906
927	935	946	976	979	996	998	1024	1028	1029	1040
1041	1050	1077	1079	1084	1093	1102	1105	1106	1107	1108
1109	1110	1112	1113	1115	1116	1117	1119	1120	1121	1122
1123	1127	1130	1131	1134	1135	1147	1149	1151	1153	1201
1220	1223	1228	1230	1244	1250					

DEATH OF C. F. V. RANDALL.

The St. Albans (Vt.) *Messenger* referring to the recent death of Mr. Randall, says:

"After acquiring such an education as the public schools of Northfield afforded, Mr. Randall learned the art of telegraphy and was employed at Northfield, White River Junction and Rouses Point, prior to his coming to St. Albans some seven or eight years since. In every place he made many friends and no enemies, and being expert and faithful in his business, won the position of chief operator at this most important station. He was offered by Gen. Butler, when in command at New Orleans, the best place and highest pay in his department, but was persuaded by Gov. Smith to remain here. Last year, on the promotion of Geo. L. Stone to be one of the division superintendents of the Vt. Central, Mr. Randall was made the master train dispatcher of the entire line—a position which he filled in the most masterly manner."

The *Free Press* adds:

"'Death loves a shining mark,' and in this instance the point is made complete. His loss, which must be almost irreparable to the railroad managers, is severe among his many acquaintances also. He was one of the best boys we ever knew, of honest and correct habits, from one of the best Vermont families. Modest and retiring, he was capable and true, and a gentleman in the best sense of the term. He was highly respected by his associates and by newspaper men especially, who ever remember his courtesies and genial good qualities."

Mr. Randall was not a member of the Association.

IT seems that the pleasant story respecting Miss Josie Mitchell, of St. Charles, Mo., is a hoax, for which some imprudent operator ought to be made to *Swett.*

OUR friend Purnell, of Opelika, Ala., has left his express duties, and now devotes himself loyaliy and exclusively to the telegraph service.

TO REVIVE THE COLOR OF BLACK CLOTH.—Take of blue galls, bruised, four ounces; logwood, copperas, iron filings, free from grease, and sumach leaves, each one ounce. Put all but the iron filings and copperas into one quart of good vinegar, and set the vessel containing them in a warm water bath for twenty-four hours, then add the iron filings and copperas and shake occasionally for a week. It should be kept in a well-corked bottle. It may be applied to faded spots with a soft sponge. It is good also to restore the black color of leather when it turns red, the leather being previously well cleaned with soap and water.

THE ANNUAL REUNION OF THE TELEGRAPHERS OF CENTRAL AND SOUTHERN NEW YORK.

The place designated for the meeting this year being at Elmira, a party of nine telegraphers from Syracuse, Rochester and Auburn, left here on the afternoon of the 29th, reaching Owego on time. They were met and escorted to the Central Hotel, where, after friendly greetings were exchanged, the party partook of a bountiful supper. Leaving Owego Thanksgiving morning at 7:20, they were joined on the train by brother operators from Binghamton, Susquehanna, New York, and other points east.

On arrival at Elmira, our party were met by Messrs. Berry and Lewis, of the Erie R. R. Telegraph; Palmer, Garnsay and Putnam, of the W. U. Telegraph, and Easterbrook, of the Northern Central R. R. Co., all of Elmira.

After warming up, the party returned to the depot to meet Western telegraphers, who arrived at 12:03; then back to the Rathbun House, more telegraphers joined the party, making the number between thirty and forty. At one the party repaired to the spacious dining-rooms, where a huge repast was served. After dinner the party went below to the W. U. telegraph office where greetings were sent to L. Tillottson, of New York, formerly Superintendent of the Erie Telegraph lines, and to the present Superintendents of the 7th and 9th divisions, after which the party were invited to a drive. At 4:30 they proceeded to the depot, where a comfortable room was tendered for their use by Supt. Gardiner, to which the party adjourned.

Mr. Graham being called on, responded by thanking the Erie boys for their hospitality, and proposed that these meetings should be made an "annual institution" hereafter, to be held on the line of the N. Y. Central and Erie, and he proposed that the next meeting should be held at either Syracuse or Rochester, Thanksgiving, 1872.

Mr. Angell, of New York, extended an invitation to hold the meeting at New York.

Mr. Berry, of Elmira, took the floor, stating that he took great pride in these reunions, and hoped they would be imitated throughout the country by the telegraphers, and thought that by becoming personally acquainted, there would be a better spirit and feeling over the wires, and everything in our business would be more harmonious.

While accepting the invitation to visit Syracuse, he would remind the boys of their last two meetings in cold weather, and suggest that the day should be changed to July 4th, which, being a holiday, will give us as good a chance to be present as on this day, and as every city or place was in its full beauty at that season of the year, it would be more enjoyable.

Motion to change the day being seconded, it was carried unanimously.

BORN.

To Chas. M. Kinnaman, manager W. U. Tel. office, Tiffin, Ohio Dec. 2d, a son.

MARRIED.

EDSON—HAZELTON.—At Johnsontown, N. Y., Nov. 15, by Rev. C H. Baldwin, Hubert S. Edson, manager W. U. and Erie Railway Telegraph, Corning, and Miss Delia Hazelton, both of Corning, N. Y.

VENABLE—FORREST.—At Towanda, on Dec. 6th, at the parsonage, by the Rev. S. J. Lusk, E. A. Venable, of Oxford, N. J., now operaror Dispatcher's office Pa. and N. Y. R. R., Towanda, to Miss Nellie Forrest, of the latter place.

DIED.

BUTLER.—In Plymouth, Dec. 5, of consumption, Thomas D. Butler, aged 20 years and 4 months.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 3. NEW YORK, JANUARY 1, 1872. WHOLE NO. 100.

TELEGRAPHIC COMMUNICATION WITH CHINA AND JAPAN.

THE rival advantages of submarine and over-line telegraphs between England and the Far East are about to be put to a very practical test—that of competition. The China Submarine Cable is really submarine for the whole distance from Falmouth to Hong-Kong. The new line—the Great Northern—which is now brought into operation, is carried through Russia, Siberia, the Amoor, and so on to Wladiwostok, on the Pacific, a distance of some 6,000 miles by land. The advantages of a submarine cable over a land line are too apparent to need a lengthy notice. There is not the same liability to mistakes in transmitting messages from intermediate stations, nor the delay required for such subsidiary messages, and not the same liability to interruption by winds or floods. In order to counteract the effect of this inequality, we understand that the Great Northern Company intend to convey messages at £4 6s. instead of £7, the present rate by the Submarine. This tariff will probably turn out to be a pretty fair estimate of the comparative value of the two lines. The Submarine has for weeks past brought daily messages from Hong-Kong in from five to seven hours, which, allowing the difference of time between London and Hong-Kong, practically amounts to a gain of time, as messages despatched from Hong-Kong at 11 A. M. are received in London at 9.30. With the duplicate lines in working order, therefore, no anxiety need be felt about the maintenance of telegraphic communication with the Far East. The accommodation already provided must be amply sufficient for their requirements, and is not very likely to fill shareholders' pockets with extravagant dividends. We would, therefore, caution the public against a third scheme, which, we hear, is about to be proposed. It is a common remark that opposition, or rather competition, is good, because it protects the public by preventing monopoly. But this is a dictum which must be taken with several "grains of salt." According to our own observation, it generally turns out that two rival schemes, after competing with each other furiously and ruinously for a short time, become persuaded of the policy of amalgamation. Moreover, when a few enterprising men have labored for years, and taken the risk of laying submarine cables to India and China without Government aid, we think they are entitled to some consideration from the public, and there can be no doubt that our China messages are conveyed cheaper by lines that are practically in the hands of one management, such as the British Indian, the Extension, and China lines than by any other. There is one cable still required to connect Yokohama. At present, the submarine lines of the Great Northern Company only extend from Wladiwostok to Nagasaki, Shanghai and Hong-Kong. The traffic to Yokohama would not warrant the laying of a special cable either from Hong-Kong or Wladiwostok; it must, therefore, be laid between Nagasaki and Yokohama—a distance of about 600 miles. We understand that a land line is to be laid by the Japanese Government connecting these places; also Osaka, Hiogo, and places in the Straits of Simonosaki, which will be completed next year, the wire and all necessary apparatus having been sent out from England.—*London and China Telegraph.*

ACTION OF LATERAL ELECTRIC CURRENTS UPON THE PRINCIPAL CURRENT.

THE effect which an electric discharge produces by its inductive influence upon closed neighboring circuits, and the action which the lateral currents, thus created, exercise in their turn upon the principal current, constitute one of the most frequent annoyances in electrical experiments. Herr Reiss has lately investigated this reaction of the lateral currents upon the primary and also their reciprocal action, the one on the other. Experience has proved that this modification of the principal current affects the duration only of the electric movements, but not the quantity of the electricity displaced. In order to make this perfectly evident, the author made use of his electric thermometer, and found that the magnetic needle gave no indications other than such as would have been produced upon the electric spark by the elongation, more or less, of the circuit. On the enfeeblement of the lateral current by the introduction of greater and greater lengths of fine platinum wire, the author observed that the principal current gradually diminished from 100 (its initial value corresponding with the maximum conductibility of the secondary circuit) to 62, but ascended to 104 or thereabout, upon diminishing the intensity of the lateral current. When the circuit of the secondary current was broken, it was raised to 144.

Herr Reiss has also studied the case of two lateral currents, so disposed as to have an equal bearing upon the primary current, and has found that when the resistance of one of the secondary currents (at first very feeble) is gradually and continuously increased, the secondary current at first diminishes, afterwards increases, diminishes a second time, and finally increases; thus passing through two minima and two maxima successively. The primary current attains its greatest value at the moment of the first minimum of the secondary current, it then gradually diminishes, without changing its course, to the moment of the secondary minimum of the secondary current, and ends by becoming constant. In this manner (thanks to the intervention of the second lateral current), it appears that a *constant* primary current is produced by the influence of a *variable* secondary current, in a circuit in itself *invariable*.

From these experiments the author draws the following conclusions:

1. The reaction of the secondary current upon the primary discharge does not attain its maximum value when the current is at its greatest intensity, but when it has been notably enfeebled.

2. Two lateral currents of this same kind mutually weaken each other when they are in the same direction, and reinforce each other when they are in opposite directions.

THE NEW YORK GENERAL OFFICES.

THE NEW OPERATING ROOM.

As we begin this article the operators engaged at the Western Union Telegraph Company's General office, 145 Broadway, are like bees preparing to swarm. As one looks through their present hive, with its low ceiling and dingy walls, the side lights leaving half the room in comparative obscurity, the necessity of a change becomes painfully obvious. Yet, when first occupied, it was deemed a rare place for the operator's work. We were the first occupants of the rooms just beneath. In 1858 Gen. Lefferts rented the building for the use of the American Telegraph Company and its associate lines. The rooms beneath the present operating room were rented to us, in connection with space in the receiving and delivery departments for the service of the New York, Albany and Buffalo Telegraph Company. We believe they were long regarded as the pleasantest for the performance of duty in the whole country. They are surpassed now by many in elegance, and many more resemble them in the feeling of comfort which made it a home to those connected with it.

In the arrangement of the operating room of the American Telegraph Company, under the management of the able Superintendent, J. C. Hinchman, Esq., the plan of running the office wires over the office tables on miniature telegraphic poles was adopted. The office was on the same floor with the receivers. The multitude of wires traversing the room, festooning every operating table, gave the public an idea of the magnitude of the Company's business. It was an interesting sight and an excellent avertisement. The office at 145 Broadway became practically *the* Telegraph office of the city.

We took another plan. We had no public to provide for. We occupied premises necessarily private. So, with care and patience, we led the Western wires through concealed passages to two clock faces armed with switches, each of which did not exceed a foot in diameter. From these we led the wires, planting them with our own hands, along the grooved wash boards and beneath the floor, up the perforated legs of the operating tables to the magnets and keys. Not an inch of wire was visible. The arms of the clocks made all necessary changes and connections. All tampering with wires was prevented and unprovoked. The operating tables were in desk form, with an enclosure for the machinery having a piano front, which could be used to reduce the sound, as the operator might desire, and also preserve the machinery from undue exposure when not in use. To reduce the sounds of so many instruments the floor was covered with heavy matting, and, to add repose, the walls and ceiling were kalsomined with neutral tints and preserved absolutely plain.

But now, in increased proportions, and with greatly enhanced effect and comfort, a new and, in every respect, superb room is being prepared for occupancy. By the time this meets the reader's eye it will be in possession of a corps of 100 delighted men. The upper floor of the building, formerly occupied

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by the janitor and batteries, have been converted into one large, spacious room 110 feet long by 30 wide. Along the northern side and eastern front 16 windows give a cheerful light. This is greatly enhanced by a spacious skylight inserted into the ceiling, extending from end to end of the room. The skylights are arranged to admit light without glare, and so that the whole air of the room can readily assume, without disturbing draughts, the purity of the external air. The apex of the skylight is about 15 feet from the floor. With a taste which we commend, the walls are preserved from doubtful decoration, and finished in simple neutral coloring.

Into this room, through a cupola on the roof, are introduced 231 WIRES. Of these there come

From the South	31	wires.
From the West, via Allentown and Erie roads	15	"
From the West and North, via Hudson R.R.,	10	"
By Harlem railroad	10	"
From the East	21	"
From Long Island, Sandy Hook, &c	3	"
From auxilliary N. Y. offices and branches, including 50 "loops"	141	"

All these wires are made to pass through a double bank of lightning arrestors around the cupola. These arrestors are connected with a quarter inch copper wire, terminating in massive ground plates in the earth.

THE SWITCH.

In the centre of the southern wall a handsomely partitioned receptacle is located for the switch which distributes the wires to their appointed desks. This receptacle is twelve feet long by three feet deep. A door at each end gives access to the entering wires and to the rear of the switch board, so that every connection is easily accessible. Two gas burners illuminate every part.

The wires from the cupola, led down to thumbscrews on a ledge two feet from the floor, are all carefully designated, and form a kind of organ key board, on which the voices of commerce whisper to each other throughout the continent. From this ledge the wires are led to

THE SWITCH BOARD.

This is the largest and most comprehensive of any in America. It measures twelve feet long by three feet wide, and has in its construction no less than

SIXTEEN THOUSAND DISTINCT PIECES.

The appearance of the switch board is exceedingly elegant. It stands beneath a canopy of black walnut, of neat finish, with cornice of symmetrical proportions. At the base it is surrounded by an elegant counter of black walnut, of about eighteen inches width, on which are placed the machinery used by the managers of circuits in holding correspondence with offices on the various wires in the prosecution of their duties.

The city wires, worked by the Ladies' Department, two stories below, are led under the main switch to one of smaller proportions on the west wall. This switch accommodates 50 wires, in addition to the necessary battery connections.

All the wires running from the switches to the instruments are of gutta percha covered copper wire, made up in cables of eight wires each, and carefully covered in tarred canvas. The local and main battery wires are clubbed in the same way, and all led beneath the floor to their points of connection. About six miles of copper wire are thus used.

Along the room, standing five feet apart, are 28 tables, made of black walnut and chestnut, six feet long by four wide. These are subdivided by glass frames, placed so as to divide the surface of the table in four equal parts or compartments, accommodating, without interference, four sets of machinery. Thus one table accomodates four operators, and, in the entire room there are places for an operating force of 108 men, exclusive of those engaged at the printing instruments. In the centre of each table is a neat gas fixture, with porcelain shade, giving the whole room an appearance of great neatness, appropriateness and elegance. In the centre of the room are arranged the repeaters, on tables similar to the operating tables, having all the latest improvements, and under the immediate eye of the circuit managers.

On the south wall, in rear of the switch, is a neat enclosure, surrounded by a continuous desk for the clerks who handle the messages. Along the front of the desk neat pockets are constructed for depositing the messages. These are formed of slips of plate glass, duly labeled, so that the contents of each are easily seen. Ten clerks are employed in this department. Their duty is to receive and distribute the messages from the pneumatic tubes, copy and number for delivery all incoming messages, and drop them to the delivery and city departments.

Connected with this department are two copying presses, run by steam power. These consist of three iron rollers, with one of rubber in the centre. Through these, which are continually in motion, are passed all messages for the general delivery or for city line distribution, as they come from the operating tables. A piece of moist paper, always ready, is placed upon the message to be copied; it is then grasped by the first roller, pressed by the second, and is quickly issued, ready for passage to the tubes by the third. Thus, every message is preserved.

Terminating on the wall in the rear of the clerk's desk are the pneumatic tubes, four in number, connecting with the Receiving department, Ladies' operating department, and Cable room. These tubes are supplied with air by a Baxter upright steam engine in the basement, and render the connection of the departments of service complete and immediate, messages passing to each with great promptness.

Six printing instruments are placed along the south wall, and are propelled by steam power from the same engine which operates the tubes and presses. Formerly these were operated, or kept in motion, by men called "grinders," using a crank, and working in rear of the instruments. Six men are thus dispensed with, and the speed rendered uniform and continuous. These printers turn out, sending and receiving, about 2,500 messages per day. The Morse machinery transmits, sent and received, an average of 14,000 messages per day. Total average per day, 16,500.

The room, thus perfectly provided, is warmed by hot water pipes, which traverse the entire room. No more comfortable, healthful, cheerful, or well appointed office can be found. It is under the management of Mr. A. S. Brown, a most practical, excellent and well informed gentleman, who maintains an admirable discipline, without separating himself from the esteem and confidence of those under him. His assistants are

Mr. A. S. Downer, Mr. Gerritt Smith,
Mr. D. R. Downer,

gentlemen too well known to require encomium from us.

The night force is under the management of Mr. Thos. Dolan, assisted by

Mr. W. K. Applebaugh and Mr. C. S. H. Small, all well known and respected by the craft.

STAFF OF THE MAIN OPERATING ROOM.

Operators.

T. Allen,	J. Knittle,
A. H. Babb,	J. F. Knapp,
M. C. Bagley,	M. Labaugh,
E. J. Bevan,	M. J. Landy,
T. J. Bishop,	T. J. Landy,
D. Blackham,	L. J. LeFancheur,
W. Blanchard,	J. Lenhart,
S. S. Bogart,	E. A. Leslie,
L. Bradley,	R. B. Lown,
J. Brant,	H. J. McCormick,
M. R. Brennan,	W. G. Magowan,
M. Brick.	R. W. Martin,
J. K. Calvert,	D. W. McAneeny,
C. C. Carpenter,	J. B. McDonald,
P. J. Casey,	T. M. Miller,
F. Catlin,	J. F. Moore,
—— Chipman,	R. H. Morris,
S. A. Coleman,	R. Morton,
E. C. Cook,	P. Mullarkey,
G. Cromwell,	C. C. Murphy,
D. W. Daly,	J. M. Moffatt,
J. R. Dennis,	J. J. O'Conror,
J. H. Dwight,	D. O'Keefe,
J. L. Edwards,	T. H. O'Reilly,
S. H. Edwards,	F. J. Owen,
H. Filchett,	J. F. Olmstead,
P. H. Flynn,	J. C. Perkins,
E. G. Foote,	K. S. V. Randolph,
T. Fullon,	C. L. Rogers,
W. Garland,	S. S. Schroff,
A. W. Gordon,	G. M. Simmons,
E. Gordon,	C. H. Smith,
H. L. Gramzow,	R. Sprague,
F. W. Gregory.	E. D. Stevens,
S. L. Griffin,	W. T. Stone,
W. H. Groff,	E. N. Taylor,
E. M. Harris,	G. K. Walcott,
J. Hemmens,	G. W. Waldron,
C. E. Higdon,	G. A. Weiss,
W. H. Hoyt,	L. E. Weller,
J. B. Hurd,	E. F. Welsh,
H. P. Jones,	W. B. Wood,
J. W. Kelley,	R. J. Williams,
T. G. Kennedy,	T. Williams.

Clerks.

J. N. Applebaugh,	J. Ford,
W. L. Bourne,	W. Giles,
S. K. Dingle,	C. H. Hildreth,
J. Donnelly,	J. H. Lyman,
M. Dooley,	C. T. Raymond,
L. Dowling,	T. Southard,
J. J. Eckstein,	F. C. Ward.

Office Messengers.

E. J. Anderson,	L. Miller,
W. Barron,	W. B. Richmond,
J. Charlton,	T. J. Ryan,
H. Cunningham,	M. Stout,
H. J. Garvey,	P. J. Tiernay,

J. W. Wood.

Battery.

C. McCarthy, M. Dowd,

J. Leary.

The whole of the arrangements thus somewhat imperfectly stated, as well as the original proposal to devote the premises to the purpose now so happily consummated, are entirely due to Gen. Eckert, General Superintendent, whose executive ability and taste can be seen in every part of the work. He has been ably seconded by Mr. Bateman Cates, from Boston, to whom was assigned the supervision of all the mechanical part of the work, and who has proven himself a man of rare energy, thoroughness, and skill. We congratulate the staff on their new and beautiful apartment, and hope they may long live to enjoy it.

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IN CONGRESS—BUYING THE TELEGRAPH LINES.

Mr. Chandler, of Michigan, offered a resolution to refer so much of the President's Message as relates to the telegraphic system of the United States to the Committee on Commerce, and argued in favor of the resolution. In his opinion, the time had come when the relations of the telegraphic system to the commerce of the country ought to receive the careful attention of Congress. If the telegraph was an instrument of commerce, then Congress had power over it under the provision authorizing it to regulate commerce, and he thought it was clear that it was to be regarded mainly as an instrument of commerce, because probably three-fourths of the messages sent by telegraph were on commercial business. He contrasted the cheapness of telegraphing in Europe with its expensiveness here, and said that one of the great advantages of the European system would be the breaking up of the oppressive monopoly known as the Associated Press. But while he thought the Government should control the telegraphic lines, he would not be willing to buy the existing lines at the prices that the companies would be likely to ask, because he understood that there was a much larger proportion of water than money in their stock, and he was opposed to paying high prices for water. He would, however, agree to pay the actual cost of constructing the lines, or even what it would cost to construct them now, but no more.

Mr. Hamlin, of Maine, remarked that the whole subject had already been very properly referred to the Committee on Post Offices and Post Roads. If the telegraph question was to be regarded as within the province of the Committee on Commerce because most of the messages sent were for commercial purposes, then the Post Office Department also would come within the domain of that committee, because most of the letters sent through the mails related to commercial business. The resolution was laid over.

NEW QUARTERS—REMOVAL OF THE WESTERN UNION TELEGRAPH OFFICE.

Our friends of the Western Union Telegraph office have just got fairly at work in their new establishment, on the northeast corner of Third and Olive streets, and it is probably one of the best appointed of its character in the West. The edifice is a four-story marble front, and is mostly occupied by the company.

On the first floor, leading to which are two entrances, are the receiving and delivery rooms, a room for messengers, &c. Everything is with close regard to commodiousness.

The second-story front rooms are devoted to the business and private offices of the superintendent.

On the fourth floor is a large operating room, leading to which are thirty wires, running in all directions. Here, the arrangements in every particular are admirable. An average of two thousand messages a day are received, not including the very lengthy press reports.

THE FORCE

of the St. Louis office numbers about ninety-four, and is ranked as follows:

Colonel R. C. Clowry, superintendent of lines in Missouri, Kansas, and portion of Illinois, Iowa, Nebraska and Colorado. Colonel Clowry has 346 offices in his district.

Isaac McMichael, supply agent and chief clerk.

E. H. Brown, manager St. Louis office.

J. C. Hanchett, chief operator, St. Louis office.

C. W. Hammond, assistant chief operator, St. Louis office.

John A. Hobbs and A. E. Haquette, receiving clerks.

Joseph Hollohan, delivery clerk.

Also, twenty-six operators, fifteen clerks, forty-three messenger and check boys, two line repairers, one battery man and one janitor.

C. H. Sumners, the company's electrician, laid the wires and connected them in the most perfect and artistic manner.

We congratulate Col. Clowry upon this change. *St. Louis Democrat.*

A PROPHECY.

I would like to place upon record this opinion: that if the "State to State" tariff be adopted under anything like the existing conditions, the experiment will, financially, be a failure. ***

To the Editor of the Journal of the Telegraph:

In the Journal of November 15 a new way of making up the tariff is hinted at as possibly to come into use. Any tariff which does not recognize distance must be unjust and discriminating, and such would that be. Now, there is a plan, by which the most perfect uniformity and precision can be reached, which, if adopted and adhered to, will, in a short time, compel the proper distribution of circuits, distributing centres, &c. Some system must be adopted and stuck to, in order to derive from it all its advantages; and if justice to both the public and the company can at once be secured by any plan, that plan is the one to be accepted. No revolutions in the business could affect the plan I have digested. The tariff from every office to every other office could be changed, in a general notice of a score or so of words, and not a single office make a mistake. No expense of any moment would attend the adoption, because the material of which it should consist is now in the possession of the company. The brick and stone are all at hand; you need but the mason and the architect.

In conclusion, I will say that it is useless to offer suggestions or plans, by the adoption of which the company would make money or save money, if that is to be the end of it.

If there are none whose duty it is to inquire into or practice anything new, I, for one, might as well cease to waste the hours I could spend in sleep.

In the present disintegrated state of the integral parts of this vast corporation, it is about as impossible to adopt a good plan as it would be, in a political convention, to pass a resolution where there was no president, vice-president, secretaries, committees, &c. We have no conventions of practical telegraphers, no place or time for the interchange of views, facts, experience, or anything else which might be of general interest and profit. *Must* it always so be?

If the company wish to see my plan, and will give it fair examination and mature deliberation, I will take pleasure in drawing it neatly and comprehensively. ***

NOTE.—Send on your plan. We promise it attention. What we want is a plan, not a complaint; not a prophesy of failure, but a project promising success.

GLAD OF IT.—Mr. Simeon E. Mayo is meeting with well-deserved fortune in Albany. Sim. is one of the best fellows in the world, and all of his old friends will rejoice at his promotion. The Albany *Times*, of Saturday, says:

"Mr. S. E. Mayo, General Ticket Agent of the Delaware and Hudson Canal Company, Susquehanna Railroad department, has been appointed to the like position on the Rensselaer and Saratoga Railroad, vice O. N. Crandell, of Troy."

(We are glad of it, too, and we know it to be deserved.—*Ed. Jour.*

ANNUAL ELECTION OF DIRECTORS OF THE INTERNATIONAL OCEAN TELEGRAPH COMPANY.

The annual election of Directors of the International Ocean (Cuba Cable) Telegraph Co., was held at the office of the Company in this city, Tuesday, December 12, 1871, and the following gentlemen were chosen for the ensuing year: Messrs. Henry K. Bull, M. L. Delafield, David H. Haight, Alexander Hamilton, Jr., Robert J. Livingston, Charles Knap, James T. Sanford, Wm. F. Smith, and E. S. Sanford.

At a meeting of the Directors, held on Wednesday, December 13, the following officers were unanimously elected: President, Gen. W. F. Smith; Vice-President, James T. Sanford; Secretary, Alex. Hamilton, Jr., and Thomas P. Bladen, Treasurer.

WASHINGTON, Dec. 19, 1871.

The President of the Western Union Telegraph Company was before the Committee on Ways and Means this morning, and made an argument in behalf of a proposed reduction on telegraph wire. No action was taken.

SAN FRANCISCO, Dec. 16, 1871.

A bill has been introduced in the California Legislature, and referred to the appropriate committee, giving to the Pacific Submarine Telegraph Company the right to construct lines and land cables for an interoceanic telegraph to China and Japan, either direct or by the way of the Hawaiian islands.

RELATION OF HEAT TO ELECTRICITY.

To the Editor of the Chemical News:

It is generally said that the heat produced by a current of electricity varies as the square of the current (with the same resistance). I have no doubt that this is true in the cases from which the rule has been deducted, namely, where the sources of the electricity have been the same.

The following experiment would tend to throw a doubt on the general truth of the rule where the electricity is derived from different sources:

I took two elements, one of zinc-platinum and the other of iron-carbon, with the same electrolyte. The current from the former was 87° on a tangent galvanometer, of the latter 85; consequently the heating effects of the two currents ought to have been as the squares of the tangents of those angles, or about as 36 to 13; yet, on trial, I found the former would keep only about 1¾ inches of a platinum wire red hot, whilst the latter would keep 2¼ inches of the same wire red; also in deflagrating different gauges of iron wire, I found that the latter would deflagrate like tow wire, which the former would keep scarcely red hot. The sparks from the latter were also much more brilliant than from the former, emitting bright flashes and scintillations when a copper wire was rubbed along the rough edge of a rusty piece of iron.

The subject is worth investigating, and I venture, through your columns, to call the attention of scientific men to the point.

I am, &c., H. HIGHTON.

INTERNATIONAL TELEGRAPHIC CONFERENCE.—Mr. A. E. Chambre, one of the principal officials of the telegraph department of the General Post Office, has been appointed delegate or representative for the British Postal Telegraph Department at the International Telegraph Conference now being held at Rome. All the states of Europe will be represented at the conference, England taking a part therein for the first time since the telegraphic system of the kingdom has been acquired by the state.

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ELECTRIC BATTERY OF D. M. COOK.

We learn that Mr. Cook is about to bring this invaluable invention before the world, and we anticipate wonderful results from it, as it must work out an entire revolution in the history of electric and calcium lights. We understand that twenty-six cups, under Mr. Cook's arrangement, yield a light equal to four hundred lamps, at an expense not exceeding ten cents per hour, greater results being obtained at much less expense in proportion to the amount of light.

The principle of this battery is entirely new, it having been overlooked by other electricians. It is very simple in its construction, composed of only a new combination of the old materials used in other experiments. It is composed of seven or more simple elements united as one, and their electric quantities read about as 1, 3, 6, 12, 24, 48, 96, for one compound element, while two of these, united as one, constitute a quantity battery two hundred times that of a "Grove," and one hundred times its endurance, consuming but one hundredth part of the material in doing the same amount of work. This renders it a source of light for public purposes much more economical than gas.

And we hail with pleasure the day when our cities and towns can be illuminated with this sparkling light. One thing is certain, that this new element opens the field for the successful application of electricity that heretofore could not be made, since the chances of success by this are more than a hundred to one over that of the old element.

We trust Mr. Cook will meet with the encouragement from all lovers of the sciences in the domonstration of this new principle of electricity.—*Exchange.*

TELEGRAPHY IN FRENCH RIVERS.—Workmen have taken up two telegraphic cables laid down in the Seine between Rouen and Paris, shortly before the seige of Paris, to enable the capital, if invested, to communicate with the provinces. The last portion of the wire, between Carflaus and Paris, was completed two days since, and the cables have been sent to Toulon to be repaired.—*Engineering.*

THE GREEK ARCHIPELAGO CABLES.—The Malta correspondent of the *Times* writes under date of Valetta, Nov. 11th: The submarine line of telegraph between Corfu and Zante was completed in the early part of November, but will not be opened till the completion of the land line between Point St. Gordi and the town of Corfu—a distance of thirty miles—which will be ready to-morrow, when the new and rapid route to the Ionian Islands, the mainland of Greece, and the most important islands of the Greek Archipelego, as well as Candia, will be available.

DIED.—At Plymouth, Ind., December 7, 1871, Robert Poe Fulton, in the thirtieth year of his age. Mr. F. has been for several years past Agent of the P. Ft. W. & C. R. W., at Plymouth, Ind. He posse sed fine business qualifications, secured the entire confidence of employers, and of all others with whom he had occasion to transact business.

Mr. Fulton was an operator of many years standing, mostly on my lines, although at one time a manager or chief operator of the Old United States Lines in Philadelphia. While working for me he was promoted to the Station Agency at Plymouth (some two or three years ago), since which time he has handled the key only in emergencies, which he ever stood ready to do. At the time of the "strike," he volunteered his services, doing double work, almost, in addition to his duties as Agent. He was one of the "old guard" which rallied around the company so nobly in its extremity, and saved it from defeat. He was a true man, and has gone to his reward.

O. H. BOOTH.

INTERPRETING RULES.

To the Editor of the Journal of the Telegraph:

A gentleman telegraphed West to the house for which he was traveling, asking instructions for his future action. After waiting all day for his answer, he called at 7 or 8 o'clock in the evening, and was informed that his message was received, but being *red*, could not be delivered till morning. The gentleman offered the unpaid half tariff, stating that he wished to go West that evening, but the manager regarding the rule as inflexible, would not deliver the message, and the gentleman remained over night on expense, with loss of time, which, considering the season, was valuable to him, to receive his message in the morning.

I should have helped that man off the evening before by giving him his message, and though I had broken one of the Company's rules, I should have made a friend for the Company, and saved it from the abuse to which I, as well as numerous others, listened in my office the next day.

NOTE.—We cannot agree with X. The house for whom this agent served sent a "red" message to save a paltry sum of money, and it cost them a night's expenses at a hotel, and the detention of their agent. It served them right. When a man chooses to ride on the top of a coach so as to go for half price, he must take his chance of the rain. The agent's cursing was ill directed. He ought to have, barring the cursing, vented his wrath on his stingy principals.

WHAT BOOK SHALL I BUY?

SHAWNEE, KANS., Dec. 12, 1871.

To the Editor of the Journal of the Telegraph:

Having noticed that you, in almost if not quite every issue of your valuable paper, answer questions asked you by correspondents, I therefore take the liberty of asking one, hoping you will consider it worthy of an answer. "What is the best work treating on the subject of the telegraph and electricity, and where can it be procured?" I sometimes have questions put to me regarding my business which I cannot answer correctly, thus making me ashamed of knowing so little about my own profession. Situated as I am, at a small station, I have no advantages for gaining the knowledge I seek. By answering the above question you will confer a *great* favor on a learner of the art.

I remain, my dear sir, very truly yours,

ALF. S. FIELDING.

Reply.—For general knowledge on all practical subjects connected with the telegraph and its duties, we deem Mr. "POPES' MODERN PRACTICE OF THE TELEGRAPH" most suited for our correspondent. Its cost is $2, and on receipt of that amount we will see that it is sent to any who desire it. For Telegraphic history, and statistics, Mr. Prescott's Theory and Practice of the Telegraph is the most ample. Price, $2.50.

FORT DODGE, IOWA, Dec. 4, 1871.

To the Editor of the Journal of the Telegraph:

I am unable to explain the following. Will you be so kind as to enlighten us on the subject:

During a heavy snow storm December 3, this wire was charged with heavy electric discharges, enabling us to work, as the following will show: I cut in, and could hear nothing. I put G. W. on West and heard Eastern office calling me; could not break him, and took G. W. off, and said I was under the impression he heard me; if so, make dots and answer. I then put G. W. on West and heard him answering me, and in that way we were enabled to do a little business. I could not hear him unless I put G. W. on, or him me unless I took it off. Eastern operator worked with back stroke of key and relay. The circuit was complete through. Please give us an explanation; and is there any possible way to work a line under such circumstances? Operator East received from me with key open.

A STUDENT.

Answer.—Electrical snow currents are not uncommon. Without knowing many necessary details, we answer:

1. The East could not receive from you with a ground on, because you not only cut off your West battery thereby, but reduced, supposing yours to be an intermediate office, the storm or snow current by decreasing the length of exposed wire and manipulating where you had no command of any curcurrent.

2. You could not receive from the East without a ground, because, by grounding, you gave the East battery less of the snow current to resist, the polarity of your battery being probably contrary to that of the storm. By removing the ground you rendered the current from both storm and battery nil, by their reverse polarity and proximately equal power.

3. The peculiar mode of sending and receiving, all except the open key, would be commonly explainable by an escape, more or less heavy, between the stations. The reception on an open key shows the high tension of the storm current which leaped the open space at the key.

RED MESSAGES.

To the Editor of the Journal of the Telegraph:

A question for your next issue, with answer:

In the case of the receipt of a "red" message, Saturday evening, at an office not required to be kept open Sundays, when should the message be delivered? Is not the suspension of business between the office hours of Saturday and Monday the same as that between any other two days?

B.

Answer.—Monday morning.

A GOOD THING TO GET.

CARLISLE, PA., Dec. 13, 1871.

To the Editor of the Journal of the Telegraph:

By to-morrow's (Thursday's) express I send you a turkey (alive) for Christmas. Please accept the same, with best wishes of the sender, and hoping you may have a happy Christmas and many returns of the same.

Yours truly,

J. CAMPBELL.

To the Editor of the Journal of the Telegraph:

An incipient operator writes that he has learned all the letters and would like to borrow a machine that makes the dots, as the one he is using "only makes the dashes." Can you assist him?

Yours ,&c., ——

No. We are afraid he is a *dashing* fellow.

GREAT complaints are made of the disorganized state of the public departments in Turkey, especially that of the telegraphs and posts.

FALMOUTH, GIBRALTAR, and MALTA TELEGRAPH (LIMITED).—The ordinary general meeting of this company was held at the City Terminus Hotel, Cannon street. The report stated that the new alternative cable between Lisbon and Gibraltar was completed on the 9th October, and that the original direct cable between the same points had been thoroughly repaired and laid in a safer position. The company now possess two lines of communication between those important stations, one of the lines being used for local and the other for through traffic. The section of the Australian Company's line from Java to Australia would shortly be completed, thus insuring a further increase of traffic.

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THE GOVERNMENT TELEGRAPH SCHEME.

The President, in his Annual Message, and the Postmaster-General, in his Annual Report, recommend to Congress the serious consideration of the proposition, first suggested a few years ago, that the Government shall undertake the conduct and management of all the telegraph lines of the United States. This is a measure of such magnitude and importance as to demand more consideration than it is likely to receive in the debates of Congress, and to be discussed from a higher standpoint than that of mere partisan utility. The arguments seem to us to be convincingly against the project. The telegraph system of the United States is a private enterprise. It has grown to its present condition of comparative perfection as a result of individual energy and management, obeying in its development the law of demand and supply, and progressing as rapidly as the judicious investment of capital would warrant. If the Government may step in, under any hidden power in the Constitution to do anything and everything, and purchase all the telegraph lines of the United States, why may it not also purchase the railroad lines? And if Mr. Sumner's "sleeping giant in the Constitution" may wake from his drowsiness to grasp the telegraphs and railroads, why may he not also secure the steamboat lines on the great rivers before he lies down to take another nap? And if all these, why not the ferries, the bridges, and turnpike roads? And when he has safely bestowed all the lines and vehicles of travel under his arm, why not, for the comfort and protection of those who entrust themselves to his care, take charge of the hotels and boarding-houses? In short, where is governmental interference with such enterprises, when once begun, to stop? The line must be drawn somewhere, and we prefer that it shall remain where the necessities of the country have placed it up to the present time.

But we are told that the telegraph is a legitimate branch of the Post Office Department, and that, as the latter is under Government control, so should the former be. This is a better reason why both Post Office and telegraph should be conducted as private enterprises, than that both should be in the hands of the Government. It is quite possible to conceive of conditions under which the Post Office would be better managed as an individual enterprise than as a branch of the National Government. It is the latter by use and consent, rather than by inherent right or duty. On the one hand, there is no more reason why the Government should be compelled to carry a letter from John Smith in New York to James Brown in St. Louis, than that it should be compelled to carry a box of dry goods from and to the same parties; and, on the other hand, the Government has no more right to monopolize the carrying of the letters than it has to monopolize the carrying of the dry goods. The National Post Office system, when established, was in the nature of a burden assumed by the Federal Government for the benefit of its citizens, not of a business in which it was in duty bound to engage. The country was thinly settled and not easily traversed, and as the Government had to keep up communication with the remotest parts, the Federal mail service was established as a benefit to the people, without much additional cost to the nation. The reasons which operated in favor of the postal service are not applicable to the telegraph. The Post Office is a necessity of civilization; the telegraph is a luxury, and the Federal Government cannot afford to foster all the fine results of our advancing civilization.

If the proposition is wrong in theory, it would be still more wrong in practice. We have not the least sympathy for, or interest in, the great monopoly which now controls the telegraphic wires of this country. But we prefer to bear the ills we have than fly to others of which we know too much. Law and competition may do something to relieve us from the oppressions of the existing system; Government control would give no promise of individual relief, while increasing the sum of national trusts and national responsibilities. The fact that it would add another "bureau" or "department" to the long list of useless ones already established, is an evil which it would take a large promise of public good to neutralize. First, we would have the Telegraphic Bureau, with its chief and its clerks, crowded with men who could not discriminate between the ticking of an instrument and the ticking of a clock; attached to this would be thirty thousand operators, suddenly resolved into political integrals, and removable for political cause. The "bureau" would soon want to be a department, and its chief a member of the Cabinet. And so on to the end of the chapter—evil, and that continually.

It is urged, as one reason for the adoption of this system, that it has been successfully tried in England. We doubt both premise and conclusion. We are by no means assured of its success in England, and even if that were established, we would not be at liberty to deduce success in this country from it. There are essentials of territory, population, and business, which render any just comparison impossible. To these we shall refer again in the discussion of this important subject. The proposition now before Congress must stand or fall according to its merits and adaptabilities to the needs of American civilization and the genius of the American Government, and totally independent of examples, whether of success or failure, in other countries.

For the present, the most that can be done is to call the attention of the people to it, in the hope of getting a fair investigation and an honest verdict. It has three important bearings, in each of which it must be critically examined: first, as to the constitutional right of the Government; second, as to the precedent it would establish; and third, as to the benefits that would accrue to the people from the proposed change of management and ownership. Unless there is a concurrent and affirmative answer to the inquiries which these propositions suggest, Congress had better let the telegraph system of the country remain where it is.—*From the Missouri Democrat (St. Louis), Dec. 8, 1871.*

RAILROAD ITEMS.

Cairo and St. Louis.—This road, running through the river counties of Illinois, gauge three feet, is the pioneer narrow gauge from St. Louis. Construction is progressing rapidly. Twelve miles are ready for the superstructure. Cars will run to Sparta, Randolph County—fifty miles from St. Louis—by the first of May, and to Murphysboro, Jackson County, thirty miles further, the first of July. The road will be completed its whole length by next fall.

Railroad Extension in Michigan.—The Upper Peninsula of Michigan has but 115 miles of railroad in operation, or one mile to every 196 square miles. The upper half of the Lower Peninsula, seven years ago, had not one mile of railroad in operation, and up to January, 1870, there were but little over 100 miles of road in operation, or one mile of road in every 170 square miles. To-day, there are over 250 miles of road in operation, or one mile of road to every 68 square miles; besides, there are projected and now being constructed 300 miles of road, to be completed in 1872, when this district will have 550 miles of road in operation, or one mile to every 30 square miles.

The people along the line of the Decatur, Sullivan and Mattoon Railroad had a grand celebration the other day, on the completion of the road, which is an extension of the Chicago and Illinois Southern, from Mattoon through Moultrie into Macon county, to a point within ten miles of Decatur.

Chicago, Danville and Vincennes.—This important line is now opened to Danville, and its connecting line from Danville to Terre Haute is also completed—forming, with the Southern connection of the latter, a new and direct through line from Chicago to Evansville, as soon as running arrangements can be perfected.

INSTRUMENTS USED IN STORM SIGNAL SERVICE.

Besides the common mercurial thermometer, the Signal Service makes use of two others, namely, the maximum and the minimum thermometer. The maximum thermometer consists of a common mercurial thermometer, stationed in a horizontal position, inside the tube of which is placed a steel index; this index is pushed forward by the mercury, as the temperature rises; but when the temperature falls, and the mercury recedes, the index remains stationary, thus registering the highest temperature. The minimum thermometer is a common thermometer in which spirit is substituted for mercury; a steel index is inserted; when the temperature falls the index is dragged with the spirit; increase of temperature and the consequent rising of the spirit does not affect the index, which still remains at the lowest point, thus registering the lowest temperature.

To measure the velocity of the wind an hemispherical cup anemometer is used. It consists of four hemispherical cups placed at the extremities of two horizontal rods which cross each other at right angles. The cups revolve with the wind, and the rods, or arms, are of such a length that five hundred revolutions is equivalent to a mile of wind. These revolutions are registered by a system of index wheels, set in motion by an endless screw on the upright which supports the rods. The force of the wind is ascertained by a tube, bent like a syphon, called a wind guage. It is one-half filled with water, and its open end always faces the wind, the instrument being adjusted on a pivot. The force of the wind drives the water up the opposite leg of the instrument, which is graduated.

By putting a chemical solution in the water and pieces of prepared paper along the side of the graduated leg, it may be made to register the greatest force which the wind attains.

The rain gauge consists of a copper cylinder, its upper end closed by a funnel to prevent evaporation. The rain is collected in a second vessel placed inside the cylinder, and thence measured. The relative amount of vapor in the air is measured by the hygrometer. Two mercurial thermometers are placed side by side; one, a common thermometer, is called the dry bulb thermometer, the other has its bulb covered with muslin, from which pass threads of darning cotton into a small vessel containing rain water; this is called the wet bulb thermometer. The water rising by capillary attraction keeps the bulb constantly wet. When the air is dry, evaporation from the muslin is rapid; and, on account of heat lost by evaporation, the wet bulb thermometer indicates a lower temperature than the dry one. When the air is damp, the evaporation is slower, and the difference between the two thermometers is smaller. When the air is completely saturated with moisture, the evaporation ceases entirely, and the two thermometers are equal. *Scien. American,*

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JAMES D. REID, Editor,
Executive Rooms, Western Union Tel. Co.,
145 Broadway, New York.

NEW YORK, JANUARY 1, 1872.

1872.

Kind greeting to all. We grasp every hand as the young year opens its expectant eyes, and wish that it may be a child of joy to each one of you. There are, we notice, marks of tears on some faces, from past suffering, from undeserved neglect. There are some downcast faces, revealing disappointed, discontented, and anxious hearts. But let all these be changed to-day. Time is not alone a destroyer of good. He comes with a smooth hand to remove the furrows and inspire hope. A true heart ever wears a crown, although the outside ermine be gone. They alone are to be pitied who come upon the new year with records of a faithless past, and with no radiance upon their hearts to shine for the sake of others. That life is the richest which is the readiest for sacrifice, and 1872 has most for him who desires most for others. Such is our first thought, as we inhale the young breath of the new-born year.

The year now opened is to be one of unwonted progress. The advance of the past year has been prodigious. The year to come will not be less so. In the administration of the telegraph, especially, will this be felt. It may not attract notice. No bulletins may note the progress. But the head which felt the grandness of a bond which united two oceans, now looks on the globe as on a rope walk. The grasp is wider, easier, more intelligent, and has more of the future in it. Like a tree, the processes of whose structure thickens the trunk as the head rises starward, the telegraphic administration is not only extending, but growing in the vitality and felicitousness of its detail. The public mind proves this. It accepts the telegraphic service of to-day with a hundred fold heartier assent than a year ago. This feeling will strengthen. Another year will make the proposal of a governmental telegraph an absurdity. The keen instinct which, from the mere motives of self-interest, builds for itself, will build better for all.

Let all enter the opening year with a manly design to do his best. The business has inspiration in it. Let this be joined to a higher intelligence, and a kinder use of power, wherever held. In nothing is there such inter-dependence. The boy that, on this sharp morning, trots through the crowd with his message, is as necessary as the executive officer who arranges the pay roll and directs the service.

No INVENTION, short of the Telegraph itself, has been so successful, so profoundly useful, as the Fire Alarm arrangements now in so extensive use in our large cities. And there seems, also, as if only one system gave complete satisfaction in its employment. Its rapid introduction and widening use sufficiently attest this. And Mr. Gamewell deserves success. He has given the system which bears his name the most conscientious and scrutinizing care. Every complexity has been removed. It is utterly simple. A child can give the alarm. It is now so distributed in large cities that the fire engine seems to stand by the side of every home, ready for work. Of this we will speak more fully hereafter. No city should be without it. It is one of the necessities of our civilization.

AS AN indication of the gradual dawning of an era of more perfect sympathy between the departments of telegraphic labor we take especial pleasure in notifying the members of the Telegraphers' Insurance Association that, on his own voluntary application, Mr. Orton, President of the Western Union Telegraph Company, is now a member. His note to us was as follows:

EXECUTIVE OFFICE WESTERN UNION TEL. CO.,
NEW YORK, December 23, 1871.

Dear Sir: I desire to testify my interest in the Telegraphers' Life Insurance Association by applying, as I do hereby, to be admitted to membership.

Very respectfully, WILLIAM ORTON.

This is an important act. It must touch many hearts. It admits the common heritage of death and sympathy with the provisions which relieve its darkness. In this the President now stands beside the humblest operator. It goes further. It ensures active executive sympathy which will make itself felt at every favorable opportunity.

WE have equal pleasure in announcing that among the most recent applications are

George H. Mumford, Vice-President,

R. H. Rochester, Treasurer.

In another issue we hope to be able to publish some gratifying facts which will stimulate the friends of the Association to an increased regard for it, and indicate the pleasant and successful future which seems to be in store for it and them.

IT is characteristic of the immense impetus given to telegraphic operations during the past year, that already there is a strong opposition between London and China. Messages can be sent either by the Persian Gulf and Southern India or by way of Russia. The former is essentially a cable route, the land line being comparatively short and occasional. The latter comprises 6,000 miles of land lines, through vast regions of comparative waste. The tariff by the latter is about fifty per cent. less than the former, and, as an English editor remarks, that, perhaps, properly represents their comparative value. The land lines must, of necessity, be liable to frequent interruption as compared to a cable route. Still the cables in China seem to be somewhat uncertain. Reports of breaks in them have been coming somewhat frequently. Not satisfied with this state of contest, a third line is hinted at as under consideration. These opposing lines are often the result of collusion with the cable makers, who take a large amount of stock and thus induce capital to enter.

NEW CABLE PROJECTS.

The European and South American Telegraph Company (Limited) was introduced in London, December 5th.

Capital, £1,250,000, in 62,000 shares of £20 each.

The cable is to be in four sections.

1. Portugal to Madeira.
2. Madeira to Cape de Verde Islands.
3. Cape de Verde Islands to St. Louis, Africa.
4. St. Louis to Brazil.

The rights granted are exclusive for 60 years.

Connections will be with all Brazil, Uruguay, Chili, by contract with existing lines. Tariff to South America, £3 for 20 words, and will compete for West India business.

Three parties have claimed the Brazilian grant.

1. The India Rubber Company, who base their claim under an agreement with Balestrini, the original grantee.

2. The Telegraph Construction and Maintenance Company claim a grant in 1869. The Brazilian Minister says that his Government is free to grant this concession as soon as the claims of the original grantee, Balestrini, are settled.

3. The Chairman of the European and South American Telegraph Company says that the grant they act under was given to Balestrini in 1866; that the grant was subsequently sold for a large sum to a society of seven persons, who, by a majority vote, transfer it to the E. and S. A. Telegraph Company. Balestrini objected to this, sued, and was defeated. He then transferred his rights to the India R. G. Telegraph Works Company, who formed a company now defunct. The Court of Appeals declared Balestrini's transfer void.

The Telegraph Construction and Maintenance Company claim the grant, on the ground that they have a concession which takes effect when the grant of 1866 expires; but as the European and S. A. Telegraph Company appear in earnest, and their stock is at a premium of 1¼, and all taken, nothing more will likely be heard of the claim. Hooper's Manufacturing Company have the contract for the cable. Cost, £1,150,000. The Board is largely composed of gentlemen connected with the Submarine Telegraph Company. Whatever success may attend this new enterprise will be wholly due to the failure of the laying of the West India cables. A fine field seems lost.

Offices which have not received their State Tariff sheet should at once apply to their Superintendent therefor.

HANDSOME PRESENT.—The friends of Mr. A. B. Waite, foreman of construction in the seventh district of the eastern division of the Western Union Telegraph Company, called on Mr. Waite, at his residence on East Washington street, and presented him with a valuable Grossman watch and a beautiful chain. The watch bore the following inscription: "A. B. Waite, from his telegraphic friends, Dec. 25, 1871."

Bound copies of the JOURNAL, volumes 3 and 4, are now ready. Price, each, $2.

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THE TELEGRAPHERS' INSURANCE.

As a New Year's gift to the members of the Telegraphers' Mutual Life Insurance Association, we are extremely happy in being able to present the following letter from Mr. Orton. This is a quicker response to the feeling we felt sure his connection with the Association would evoke than we had any right to expect. We now bespeak for it a careful reading.

MR. ORTON'S LETTER.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, Dec. 28, 1871.

J. D. REID, ESQ.

Dear Sir: Referring to the conversation had with you a few days ago, and to the suggestion which I then made concerning the Telegraphers' Life Insurance Association, I now have to say:

That at the meeting of the Executive Committee yesterday my proposition was approved, and I was authorized to carry it into effect for and during the year 1872.

In order that the matter may be fairly understood I repeat the proposition:

First. The Association will not pay to the family of any deceased member more than one thousand dollars.

Second. The Company will add to the payment made by the Association one hundred dollars in each case of the death of a member of the Association who is at the time in our employ.

Third. The funds of the Association may be deposited with the Treasurer of this Company, who will allow interest thereon at the rate of six per cent. per annum.

I earnestly hope that this action on the part of the Company will result in stimulating a more active interest in the success of an Association which is capable of doing a vast deal of good at a comparatively nominal cost to each member. Although the stipulation on the part of the Company is limited to a year, I am confident that at the expiration of that time it will be cheerfully extended.

Very respectfully,

WILLIAM ORTON, President.

Three things will be noticed in this letter:

1. The prompt action of the Executive Committee in accepting the President's proposition. It is an assurance of sympathy.

2. The bonus is offered on condition that death payments be limited to one thousand dollars. We favor this limitation, as do the other members of the Insurance Executive. As the membership enlarges, as it must under the stimulus of this generous action, the average of deaths must increase in somewhat corresponding ratio; but by limiting the payment at death, a fund will accumulate, from which an occasional assessment will be paid without calling on the members. Thus, should the list swell to 3,000 members, as it may and should, and remittances be promptly and faithfully made, *three* deaths will be provided for by one assessment. We think this will commend itself to general approval.

3. It will be seen that interest at the rate of six per cent. per annum is to be allowed for deposits. This is a decided advance and advantage, and when parties send payments for coming assessments, they will have the satisfaction that they are at the same time strengthening the Association.

Thus the new year opens auspiciously. We congratulate you on this new accession to the attractiveness of your work, on all you have done, and on all you are likely to do. It is true that all this means many added hours of labor to us and Mr. Applebaugh, but we will do it cheerfully as long as we can. Let the bonds of the Association be widened, and the kindness which springs from its fellowship be made to permeate the whole service. Thus will it perform a double work. It will assuage grief, it will lighten up the darkness which death brings, and it will also elevate the hearts of the living to a nobler life.

IN our last nnmber we published a few lines, clipped from the letter of the Washington correspondent of the New York *Herald*, stating that when the matter of the Postal Telegraph system recommended by the Postmaster-General was brought up in the House, it was referred to a special committee. We thought our source of information reliable, and so used it without further thought, and in a perfunctory way sent it to press. The facts were otherwise. The subject was referred to the Committee on Appropriations. So far as the Postal Telegraph is concerned it will be a committee of non-appropriation. Public sentiment is unmistakably against it.

WE acknowledge the reception of a splendid specimen of a Pennsylvania turkey—alive—for our Christmas dinner, sent by our old friend, John Campbell, of Carlisle, Pa. He and his brother Jacob, who is now virtually in charge of the Mexican telegraphs, having built nearly all of them, were our own companions in labor quarter of a century ago. The kindly feeling existing between us then remains unbroken. Blessed is the labor which binds the hearts of the laborers together, and is productive of living turkeys.

WE have also great pleasure in acknowledging the receipt, on Christmas morning, of a handsomely framed photograph of three old and dear friends. It was headed,

PEOPLE'S TELEGRAPH LINE, CHRISTMAS, 1852.

And underneath the likenesses of

John Van Horn, now General Superintendent,

James Compton, now Sup't. Jackson, Miss.,

D. Flanery, now Sup't. New Orleans, La.,

were the words,

TUSCUMBIA, ALA., CANTON, MISS., JACKSON, MISS.

J. D. R., Sup't.

It is very gratifying to be thus remembered by the gallant men who served us in the days gone past. There are no truer men to-day; none on whom a company can more fearlessly rely. Kind of heart, persistent in labor, with an integrity which no temptation can shake, we look on their faces, feel honored by their remembrance, and say, "God bless you."

M. LOUIS, founder of the journal "*Des Postes et des Telegraphes*," has published a new mode of ærial signals for maratime and military uses, based on the Morse system. This is, simply, by the use of baloons, one dark, the other light, which may be placed in such relations to each other that one may represent a dot, and the other a dash. Or, they may represent figures, and these be the key to words known only to the parties in communication. For example, one white baloon would represent the figure 1; one dark and one white, the figure 3; one dark, the figure 2, and so on. By the use of a table, as below, two figures being signalled, one from the upper line and one from the side column, where these intersect, the letter would be indicated. Thus, 11 would be a, 22 g, 23 m, 32 h, &c.

Examples.

	1	2	3	4	5
1	a	f	k	p	u
2	b	g	l	q	v
3	c	h	m	r	x
4	d	i	n	s	y
5	e	j	o	t	z

Illustration.

U	n	i	t	e	d		S	t	a	t	e	s
15	43	42	54	51	41		44	54	11	54	51	44

This table, of course, is capable of infinite changes.

THE NEW STATE TARIFF.

This newly arranged Tariff, which gives a single rate for every office in a State, with every office in any other State, goes into effect January 1, 1872.

The exceptions are as follows:

1. **No rate shall exceed those on Special Sheet A.**
2. **In States marked with a * the existing Tariff shall continue in force, but shall not exceed the rate in the State Tariff Sheet.**

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
January 1, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since Dec. 15, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

147 Alpena, Mich.
147 Alcona, Mich.
191 Adams' Mills, O., re-op'd.
261 Arcola, Ind.
14 Auburn, Me. Check Lewiston, Me.
* Arnot, Pa.
* Antrim, Pa.
66 Ashley, Pa. Heretofore an "other line" office.
158 Beattie, Ks.
270 Bridgeman's, Mich.
260 Bangor, Mich.
271 Bennetts Ind.
251 Banker's, Mich.
262 Dunreith, Ind., re-opened.
260 Dorr, Mich.
316 Geneva Lake, Wis.
485 Gum Island, Texas.
147 Harrisville, Mich.
* Harvard, Neb.
168 Hanover, Ks.
66 Lehighton, Pa. Heretofore an "other line" office.
66 Lehigh Gap, Pa.
392 Lonoke, Ark.
192 Middleport, O.
141 Mannington, W. Va.
269 Montague, Mich.
32 Mitteneaque, or West Springfield, Mass., re-opened.
158 Marysville, Ks.
* Norton, Mass.
* Niles Valley, Pa.
147 Ossineka, Mich.
319 Opdyke, Ill.
159 Palestine, O.
59 Rockdale, Pa. P. O. address, Lenni Mills, Pa.
319 Rectorville, Ill.
66 Siegfried's Bridge, Pa. Heretofore an "other line" office.
* Sewanee, Tenn.
* Tracey City, Tenn.
66 Treichlers, Pa. Heretofore an "other line" office.
* Tioga Village, Pa.
* Wellsboro', Pa.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.		*Leaves this Line.*
Arnot, Pa	35	2	Corning, N. Y.
Antrim, Pa	35	2	" "
Harvard, Neb	140	9	Plattsmouth, Neb.
Niles Valley, Pa	35	2	Corning, N. Y.
Norton, Mass	25	2	Taunton, Mass.
Sewanee, Tenn	50	5	Cowan, Tenn.
Tracey City, Tenn	75	7	" "
Tioga Village, Pa	35	2	Corning, N. Y.
Wellsboro, Pa	35	2	Corning, N. Y.

OFFICES CLOSED.

Addieville, Ill.; Overlook Mountain House, N. Y.; Pine Hill, N. Y.; Raritan, N. J.; Southern Car Works, La.; New Haven, N. Y.; Wabash, Ill., and Waresboro Ga.

GENERAL INFORMATION.

The name of the office heretofore known as Berwick, N. S., has been changed to Waterville, N. S.; Morrison, Christian Co., Ill., changed to Morrisonville Ill.; Athens, Ill., changed to New Athens, Ill., and that of Allin, Ill., changed to Stanford, Ill.

Business for Salina, N. Y., will hereafter be checked to Syracuse, N. Y.

Business for Kutztown, Berks Co., Pa., should be sent and checked to Topton, Pa.; charges for delivery, 25 cents.

Hereafter the "Tariff for other lines" to Dean's Corners, N. Y., will be 40 and 3 from Rondout, N. Y

OFFICES HAVING "SPECIAL SHEET A."

Tariff to Jersey City will hereafter be 15 cents more than N. York city; present rates not to be increased.

WILLIAM ORTON, President.

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We are obliged to omit assessment acknowledgements until next issue.

THE POSTAL TELEGRAPH.

Mr. Creswell, in his argument for the consolidation of the Telegraph system with the Post-Office, relies chiefly upon the experience of Great Britain, where, if his statements are correct, the Government has derived from its telegraphs, in the first year of the new system, a net revenue of more than three millions of dollars. If that were true, it would be no rule for us. Great Britain is a compact little island, where the lines are short and the ratio of messages to the whole population is very high. The British figures quoted by Mr. Creswell represent an annual transmission of about 13,000,000 messages, exclusive of the voluminous news dispatches to the press; while, in the United States, two years ago, with a population nearly one-third greater than that of the United Kingdom, the whole number of messages was about the same. Considering the enormous length of our lines, and our vast area of agricultural country in which there cannot be a very general popular use of the telegraph, it is evident that the system would be far more expensive in America than it is Europe.

But Mr. Creswell's statement of the pecuniary result of the consolidation in England is not correct. He quotes from "the official report of Honorable (he is not an honorable) George Chetwynd, receiver and accountant-general of the British office," to show the receipts and expenditures for the fiscal year ending March 31, 1871, and gives the following figures: Gross receipts, £971,215 13s. 11½d.; payments out, £273,281 17s. 3½d; net produce, £697,933 16s. 8d., or $3,391,954 38. Now we have before us the official statement of Mr. Chetwynd of the income and expenditure of the postal telegraphs, not for the fiscal year, but for the 14 months ending March 31, 1871, and an accompanying report to the Chancellor of the Exchequer, by Mr. Frank Ives Scudamore, Secretary to the Post-Office; and both these documents tell a very different story from the one with which Mr. Creswell favors us. It appears, from Mr. Chetwynd's report, that the gross receipts of the 14 months were £1,068,585, from which must be deducted £270,005, paid to submarine telegraph companies in respect of collections on their behalf, and allowed to postmasters and others for delivery of messages and refunded message money. This is evidently the item of "payments out," which Mr. Creswell committed the extraordinary blunder of supposing to be the gross expenditure; and the residuary £798,580 represents not the net profit but the gross revenue! Mr. Creswell, in short, has not got at the expenditure at all.

What the cost of working the lines has been is not clear from the British reports. The whole outlay, exclusive of payments to the companies whose lines were purchased, amounted to no less than £1,397,389; but a part of this is fairly chargeable to capital account. Mr. Chetwynd estimates the actual working expenses at £470,495, and charges the remainder, £926,894, to capital expenditure. But this is a deceptive classification. Under capital expenditure he places not only the cost of extensions, amounting, as well as we can make it out, to £178,933, but all manner of outlay upon the plant (such as the very important item of maintenance and repair, for which the Western Union Company, in America, spends a million dollars a year), £177,094 for "engineering salaries, wages, traveling, and other expenses," which we should certainly charge to current expenditure, and the money spent for "preliminery instruction" and "bonuses to learners." If we refer these, and various other items, to the heads under which they really belong, we shall find the expense of the British Postal Telegraph system, during 14 months, to be £1,218,456, and the income £798,580, leaving a deficiency of £419,876. That would be equivalent to a loss of £1,749,091 a year (in gold), instead of the magnificent "net produce" of $3,391,954 discovered by Mr. Creswell. What confidence can we place in our Postmaster-General's reasoning when he has erred so egregiously respecting his facts?—*N. Y. Tribune, Dec.* 18.

To the Editor of the Journal of the Telegraph:

In case a party desires a despatch repeated, and wishes the repeated copy delivered to him, can we, under the rules, comply with his request? An answer in your valuable journal would greatly oblige,

Very respectfully, yours, ENQUIRER.

Answer.—According to existing rules, no.

THE report of the China Submarine Telegraph Company, presented on the 22d ult., states that from the opening of the line in June last the gross receipts up to the 4th of November have amounted to £26,895, and the estimated expenses to £6,550, and that the directors therefore anticipate they will be able to the 1st of January to declare an *interim* dividend of 6 per cent. per annum for the half-year terminating on that date.

THE report of the Falmouth, Gibraltar, and Malta Telegraph Company (Limited), presented on the 23d ult., recommends a dividend for the half-year at the rate of 7 per cent. per annum, which will absorb £23,576, and leave £8,897 to be carried to reserve.

THE report of the British Indian Submarine Telegraph Company (Limited), presented on the 24th ult., shows an available total of £44,823, and recommends a dividend for the half-year of 6s. per share, which will absorb £35,625, and with £1,578 balance from the last account, leave £10,077 to be carried forward.

INDIAN TELEGRAPHS.—The Supreme Government is said to have sanctioned a revised scheme for a patrolling and maintaining establishment for the whole of the Telegraphic Department in India.

M. PIERRET, formerly Inspector-General of the French Imperial telegraphs, is now appointed Director of their administration.

WE thank J. P. Dinsmore for a package of Carter's ink and mucilage. The ink makes editorial work a delight. The mucilage is dangerous to sit on, and we do not recommend it for that purpose. It sticks badly.

A SELF-CLOSING key is noticed and illustrated in the *Scientific American*, patented by Jeremiah F. O'Sullivan and Philip W. O'Sullivan, of Jackson, Miss. We have had bushels of such sent to us, all similar, yet different. They are all worthless for common use. A good switch is the best. We prefer the Caton form.

MR. JOHN POWER, operator W. U. Tel. Co., Canal street and Broadway, died, after a brief illness, December 13. He was a young man much liked and respected. In his sickness he was kindly cared for by Mr. Mitchell, manager, and who, after death, obtained a generous subscription from the operators, and saw him decently and appropriately buried. They "laid him down tenderly."

THE *Easton, Pa., Free Press* says of Miss Kate Denny, Manager W. Union Office there: "We bear cheerful testimony to the prompt and satisfactory manner in which the business of the office is conducted. Miss Denny has secured many friends by her attention to business and desire to accommodate." We are glad to see Miss Denny thus complimented.

THE W. Union Tel. Co.'s quarters in East Saginaw, Mich., have been removed to new quarters. They are spoken of as handsome and convenient. Mr. Ferguson has served the Company faithfully ten years, and still directs its affairs. Mr. F. G. Mann, once manager, is assistant operator. The East Saginaw press claim the office as the finest in the country.

A BOOK FOR EVERY RAILROAD MAN

THE HISTORY OF

THE FIRST LOCOMOTIVES IN AMERICA.

BY WILLIAM H. BROWN.

This is a deeply interesting as well as a very entertaining work. It is compiled from authentic records and original statements of old Engineers, who set up and run the first Locomotives in this country, and most of whom are still living. The work is elegantly illustrated. It contains a correct drawing of the first Locomotive brought from England in 1829, as well as of the first five Locomotives built in America, with their accompanying trains of cars.

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ON THE SPEED OF WORKING TELEGRAPH CABLES.

Theoretically the maximum speed is obtained on a telegraph cable when the ratio of the diameter of the conducter to the insulator is 1: 1·649. This fact originally pointed out by Sir William Thomson, has not hereto been taken advantage of to such an extent as might have been desirable. The reason of this is that it has been feared that the thickness of the insulator which would be required to protect the conductor would not be sufficient to resist mechanical injury. It is possible, however, that trade interest may to some extent have operated, because larger profits are derivable upon gutta percha than upon copper. For the covering being mechanically good, the nearer the conductor and insulation approach to the oretical ratio, the better the cable will be in commercial point of view; inasmuch as the same capital will procure a cable whose working capacity is greater; the working capacity representing directly the dividend which can be earned by it. The increasing scarcity of insulating gums will probably tend to induce manufacturers to find means by which, consistently with mechanical goodness, very much less insulating material may be expended. The nearest approach made as yet to the theoretical ratio of maximum speed was in the Malta-Alexandria (1861) Cable, in which the core, consisting of equal weights of copper and gutta-percha the thickness of the insulating material was was within five per cent, equal to the diameter of the conductor.

To the Editor of the Journal of the Telegraph:

Will you please answer, through the JOURNAL, if managers are to furnish "postage" for all business circulating between offices, such as "Error Sheets," copies of "Free Messages," &c.? MANAGER.

Answer.—On all legitimate business connected with the telegraph service the company pays all postages.

COWAN, TENN., Dec. 14, 1871.

To the Editor of the Journal of the Telegraph:

Please give notice of the offices opened on my lines:

Sewanee, Tenn. Tariff, 50 and 5 from Cowan.

Tracy City, Tenn. Tariff, 75 and 7 from Cowan.

This line is just completed, and is termed "Sewance Telegraph Line." It is built of No. 10 Gal. wire, and works like a charm, with 15 cups. Calland battery distributed at each end.

Yours,

J. M. STEWART.

MARRIED.

EYSTER—COPELAND.—At Washington City, D. C., Dec. 19, 1871, by Rev. Dr. Butler, Wm. R. Eyster, of Washington county, Kansas, to Miss Sarah E. Copeland, of Washington City, D. C.

WOODARD—WHITNEY.—On the 7th inst., at the residence of the bride's father, Waterford, Pa., Mr. Anson H. Woodard, Manager Waterford office, to Miss Emma A. Whitney, of the same place.

PILLOW—GRAY.—At the residence of the bride's mother, near Des Arc, Ark., December 12, by Rev. Dr. Gray, Mr. B. S. Pillow, manager W. U. Tel. office, De Vall's Bluff, to Miss Mary A. Gray.

MAXEY—MILLER.—At the residence of the bride's father, New Haven, Ky., Wednesday, December 13, 1871, by the Rev. V. E. Kirth, of Lebanon, Ky., Mr. J. W. Maxey, manager New Haven office, to Miss Addie Miller, of same place.

WHITTINGTON—FEWELL.—On Tuesday, December 12, 1871, Mr. C. H. Whittington, manager W. U. Tel. office, Manassas, formerly of Alexandria, Va., to Miss Maggie Fewell, daughter of W. S. Fewell, of Manassas.

DIED.

WITHINGTON.—At Springwater, N. Y., of consumption, on the 12th inst., Susie J., wife of Geo. E. Withington, manager W. U. Tel. office at Springwater, aged 22 years, 5 months, and 16 days.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 4. NEW YORK, JANUARY 15, 1872. WHOLE NO. 101.

GALVANIC BATTERY ELEMENTS.

From the Mechanics' Magazine.

Having made a number of tests, with various galvanic battery elements, with a view of determining their respective adaptabilities for telegraphic, signal, clock and similar work, their relative costs, constancy and strength, I send you a brief account of the results, thinking them to be of sufficient general interest.

The following cells were prepared :—

A. Leclanché's, zinc, ammonic chloride solution in water, and manganic oxide, mixed in the state of coarse powder with fine crushed best gas carbon, and packed with larger pieces of carbon in a porous cell around a carbon block. Reduced probably to dimanganic trioxide.

B. Similar to *A*, with the substitution of plumbic peroxide for manganese, and sulphuric acid, 1 to water 25, for the ammonia solution.

C. A modification of Marié Davy's element, zinc, sulphuric acid, 1 to water 25, and mercuric sulphate, securing equal electromotive force or potential, and much greater constancy.

D. Zinc, water, and plate of carbon, the latter descending to the bottom of the receptacle, and dipping into a layer of mercuric sulphate. Zinc and carbon closely approximated ; no porous division.

E. Highton's new element, zinc, ammonic sulphate solution in water, and carbon in porous cells packed with crushed carbon, and surmounted by a tower of cinders. Was made as closely as possible according to the inventor's description, the porous cell being selected for porosity and size, being 3 inches in diameter, and extending to a distance of about 6 inches above the surface of the solution, the upper part being pierced with numerous holes.

F. Zinc, sulphuric acid, 1 to water 25, and carbon packed exactly as in element *A*, *minus* the manganic oxide.

G. A new cell.

H. A new cell.

I. A new cell.

The elements *C*, *G*, *H*, *I*, if still satisfactory after further research and modifications, will be made public. All zincs exposed equal surfaces to solution, porous cells, with the exception of *E*, being precisely similar, and saturated for an inch from the bottom with paraffin ; chemicals, with the exception of acids, being the ordinary ones of commerce ; zinc, ordinary best Belgian rolled ; and the weight of substance at the negative pole, being in each case, except *E* and *F*, sufficient to neutralize the hydrogen displaced by one ounce of zinc. Current variations were determined by a very sensitive tangent galvanometer.

A word of explanation will be necessary respecting the electro-motive forces as entered in the table; these were measured, often poles were connected for two seconds by a resistance of ·197 Ohms. By this method I think a more correct estimate can be made of the practical value of the elements, for the potentials, though constantly falling on a short circuit, decreases to a very remarkable extent during the first two seconds only, the fall after that interval being small in comparison, the ratio between the force tending to produce a current ; and the current that can be maintained, even on long circuit, differs to a remarkable extent between the various descriptions of cells. For example, the element *A*, by connecting with a condenser of not too extensive a surface, and discharging through galvanometer, indicates about 1·49 Volts, whereas if tried after two seconds of current through ·197 Ohms, indicates as in the Table only 1·137 Volts, being then considerably less than some elements whose initial forces are much less than that of *A*. It is quite evident that the force as estimated by first method is seldom, if ever, available in practical telegraphy, especially in charging cables of great electro-static capacity ; whereas, by the method pursued here, results are obtained that can with confidence be accepted. The electromotive force was in each case invariably determined by three perfectly distinct methods, namely, that indicated above ; the method of Fechner, or Wiedemann, by the sum and difference comparison, and the other method due to Fechner, of direct comparison of currents through high resistance, using a zinc galvanometer of great delicacy, of 2,000 turns of fine wire and a resistance of 4,560 Ohms. Zincs being weighed, and poles insulated for 60 minutes, the potentials (E) were measured and inserted in Col. 2 of Table. After 13 hours open they were coupled in series, each one working through a resistance of ·197 Ohms. for 60 minutes, the variations in current strength during that time denoting an increase or decrease in the same respectively, unity in this and all other determinations being taken as that current producing a deflection of 45° on a certain galvanometer. After 36 hours from this time had elapsed with poles insulated *E* was as in Col. 4. Working in the same conditions as in Col. 3 for six hours, the variations determined are in Col. 5. after which the variations with open poles in 15 minutes, were entered in Col. 6. Col. 7 shows the potentials one hour after the last experiment. In Col. 8 is the current variation in twelve hours through 379 Ohms. Col. 9, 10, 11 shows the variations in three consecutive intervals of five minutes each through ·197 Ohms. only. Col. 12 contains the variations in the next five minutes through zeno. The potentials after two hours open poles were then found to be as in Col. 14. The absolute resistance of each cell was undetermined, but their relative resistances were ascertained both before and at the termination of the tests. In Cols. 15 and 16 are indicated by numbers the inverse order of the resistances, that is to say, from the most to the least conductable, before and after the experiments respectively.

ELEMENTS,	2. E. Initial.	3. Var. 60 min. after 13h. 19 ohms.	4 E. 36 hours after.	5. Var. 6 hours. 19 ohms.	6. Var. 15 min.	7. E. 1 hour af ter.	8. Var. 12 hours. 379 ohms.	9. Var. 5 min. 197 ohms.	10. Var. 5 min. 197 ohms.	11. Var. 5 min. 197 ohms.	12. Var. 5 min. O.	13. E. 2 hours after.	14. Loss. Zinc grains.	15. Order of $\frac{1}{R}$ initial.	16. Order of $\frac{1}{R}$ final.
A. (Mn_2O_3) NH_4Cl	1·115	—1·11	1·137	—·653	.326	773	—·685	—·566	—·056	·000	—·168	1·046	72·0	5.	3.
B. (PbO_2) (SO_4H_2)	1·326	— ·79	1·34	—·618	·059	·792	—·069	—·519	—·180	—·100	—·09	1·09	533·5	7.	6.
C. New Cell	1·340	·087	1·457	—·594	·594	1·237	—·061	—·55	·000	·000	—·57	1·286	129·2	2.	2.
D. (SO_4Hg) (H_2O)	1·354	— ·408	1·352	·000	·000	1·230	·172	—·224	—·304	—·072	—·111	1·314	800·0	1	1
E. (SO_4 (NH_4)2)	1.224	— ·204	1·181	—·49	·08	1·162	—·393	—·33	—·105	—·02	—·203	1·08	96·0	3	7
F. (C) (SO_4H_2)	1·245	— ·236	1·009	—·055	·04	·699	—·127	—·148	—·022	—·022	—·028	·99	—	9	9
G. New Cell	1·08	·218	1·12	·017	·087	1·068	——	—·096	·000	·000	·018	1·05	139·0	4	4
H. New Cell	1.109	— ·018	1·146	·000	·070	1·036	—·114	—.219	—·079	—·079	— ·028	1·05	157·0	8.	5.
I. New Cell	1·825	— ·079	·623	·000	·000	·618	—·052	—·024	—·000	— ·000	—·012	·898	132·0	6.	8.

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Poles were then insulated for 18 days, and loss of zinc since commencement of tests ascertained to be in grains as in Col. 14. The zinc of *A* was in the best condition, smooth and clean, but with a few small crystals. *E* was slightly more attached, but covered with a quantity of large crystals forming a continuous coat. *C*, *G*, *H* and *I* were quite clean, but slightly pitted and rough on the surface. *B* was quite dirty, very rough, and traces of much local action. *D* was perfectly clean, but very much attached, and great local action.

The results I think afford sufficient data for valuable inference. I should select *G* where great constancy is particularly essential, and final cost a consideration, the negative pole of this element being absolutely and perfectly insoluble in the solution, and unaffected thereby for any length of time, and the cost of replacing it very small indeed. When continuous action with high electro-motive force is required element *C* is indicated. The same on short circuit, where conductibility is, and expense is not a consideration, will indicate *D*. When the battery is not to be called upon for an indefinite length of time, and then only occasionally, and on long circuit, element *A* should by all means be selected, especially if placed in inaccessible position, the cost of maintenance under such conditions being remarkably small, practically nothing. When, however, great economy of working is essential, and constancy not particularly necessary, the element *E* is certainly the best, if it is to be rather constantly used, and on long circuit.

South Kensington. W. H. Coffin.

CORNELL UNIVERSITY.—A STUDENT'S LABOR FOR KNOWLEDGE.

A correspondent of the New York *Times*, recently visiting the Cornell University, describes, among other interesting particulars, a conversation held with one of the students. The interview gives a good indication of the qualities of the young man, who is a sample of a great many, in the Cornell and other institutions of learning, who are obtaining an education under what the world would call adverse circumstances. But although the labor is hard, and the deprivations great, they form the furnace of trial, to refine the intellect, and produce a mental and moral state of sterling purity and value.

"I looked around for some student who could inform me as to the progress made in the specialty of Cornell—the self supporting part of the system. At last, by good chance, I came upon a room where a young fellow of twenty-three was studying Sanscrit. Having been in India for many years, I was interested in his studies, and we commenced an animated conversation upon philological roots. We criticised Max Müller, commented on Bunsen's theory of the Pelasgic people, and heartily agreed upon the absurdity of studying Greek and Latin, which were dried sponges, out of which everything good had been taken by our ancestors. Incidentally I learned that this most accomplished gentleman was supporting himself by laboring on the farm. He generally worked three hours a day, and six hours on Saturdays, and had already got through his appointed labor for that Saturday. I asked him if the manual labor of ploughing, etc., did not stupefy him, contract the brain cells, and make his apprehension duller. He replied that it did not, because he had been brought up as a farmer, and had nothing to learn when he came to the college. He was taking the agricultural course, but had become interested in philology, and one of the professors, who knew Sanscrit, had become interested in him, and had given him lessons in that perfect language, though Oriental studies are not in the curriculum.

I said: "I suppose yours is an individual case?"

Student—Yes, as regards the philology, but not for the farm. There are twenty-nine of us who work on it.

Correspondent—Does it pay your expenses?

Student—It pays mine; but then I worked steadily during the long three months' vacation, which ended in September. I can go easy now if I feel inclined.

Correspondent—I suppose the hardest part of the work is done by laborers employed for that purpose?

Student—Not at all. There are only two teamsters hired on the farm, and all the other work is done by us. At this moment we're laying down a series of drains, and this is very heavy work indeed.

Correspondent—Did you do that this morning?

Student—Yes, for six hours.

Correspondent—And did you not feel stupefied or tired out?

Student—Not at all. I dislike the work, and was very glad to get back to this, but I was not tired.

Correspondent—Are there any other methods of earning one's support here, besides the farm?

Student—Oh yes. If you can print, you can earn more in the press room than on the farm, and soon there will be lots of work in the machine shop. The men are going to make copies of Ollivier's geometric models.

Correspondent—What's that?

Student—Why, a Frenchman of the name of Ollivier made a set of models to illustrate all the problems of geometry. A set was purchased by the State of New York, and is, I think, at Albany. They are going to make copies of these. Twenty thousand dollars were given, I believe, for the first set that he made, but our fellows here can make them for eight hundred.

Corbespondent—I see. Well, but men who can't handle tools will not be able to do that sort of thing.

Student—Certainly not. Skilled labor is at the same premium here that it is elsewhere

Correspondent—What can the men do who have only their manual strength?

Student—Well, they can work on the farm or they can grade the square.

Correspondent—They can do that, but then do they?

Student—As a general thing they attempt it, and finding it rather rough, give it up in despair, and go home.

Correspondent—Well, but that was hardly what Mr. Cornell designed, was it?

Student—No, he expected that the college would give work to every one, that cared to take it, of a kind that he could do. I suppose that this will be done in the future by outsiders, but it can never be accomplished by the college.

Correspondent—Something in the factory way, you mean. I suppose something that will utilize the grand water power that is runing to waste so picturesquely in the gorges.

Studenl—(laughing)—I guess so. I have heard that Mr. Cornell has some such scheme in his head.

Correspondent—But even then, perhaps, the men could not earn enough to keep them. Let us calculate a little. I have been through some factories in Auburn lately, and I learned the rate of wages current there. Such work as unskilled students could do would be paid at the rate of seven, say eight, dollars a week for a day of twelve hours. Now, how many hours can you average of work throught the year?

Student—About half a day if I work steadily through the vacations.

Correspondent—Very good; then that will only be four dollars a week throughout the year for everything.

Student—That would be quite sufficient. My expenses are only three dollars a week, and I earn enough over to keep me in coarse clothes.

Correspondent—I beg your pardon for the seeming impertinence of the question I am about to ask, and I beg you to believe that the spirit that dictates it is not one of mere curiosity. Are you living in this fashion from necessity, or do you perhaps wish to show that it can be done by those who have no resources?

Student—I do it from necessity; I am very poor.

Correspondent—Sir, from my heart I honor you, and if the sympathy of a stranger can lighten a road so stony, pray understand that you have it in the fullest sense of the word.

We shook hands heartily, and I left him to his Sanscrit, feeling as I walked away that Cornell meant something more than showed on the surface. We Americans have been rather apt to worship the dollar, but when poverty is so honorable and so honored as it is here, our golden idol is like to tumble a peg or so in the estimation of society."

STATE RATES.

Ontario, Dec. 30, 1871.

To the Editor Journal of the Telegraph:

Dear Sir:—I am glad to find that you hinted at a probable simplification of your tariff, in a recent number of your Journal.

The idea occurred to me long ago, but I hesitated about suggesting it, for various reasons.

The adoption of a uniform rate over the Montreal Telegraph Co.'s lines, has simplified our tariff and booking arrangements wonderfully, and an approach to a uniform rate in the United States, would reduce and simplify office labor. I do not advocate a uniform rate all over the United States, as the territory is too great—but a certain rate from any place in one State to any place in another, thereby reducing your *tariff sheet* to the dimensions of a small card, for distribution among your customers. A tariff sheet of about forty squares answering for the United States.

Yours, G. B.

An Interesting Case.—*Liability of Telegraph Companies.*—Some months since, Mr. George T. Dickerson entered suit against the Western Union Telegraph Company, claiming $5,000, because of the negligence of the Company in the delivery of a message, by which he was not informed of his sister's death at Syracuse, N. Y., until some days after the obsequies—the telegram having been directed to Gen. T. Dickerson. The defendant demurred, on the ground that the declaration showed no right of action in plaintiff against defendant; that it does not disclose he had such an interest in the subject matter of the dispatch as to entitle to sue for negligence, and it does not appear whether the defendant is sued for cause arising *ex contratu* or *ex delectu*. The demurrer was argued by Mr. Trigg for plaintiff, and Mr. N. Wilson for defendant, and a few days ago Judge MacArthur announced his opinion, sustaining the demurrer. He discusses the liability of telegraph companies; holds that in this case the plaintiff sustained no pecuniary loss; but, on the other hand, the circumstance of not receiving the message in time, would bring to him sympathizing friends, &c., and, as he was not the contracting party, the telegram having been prepared elsewhere, he has no right of action.—From Washington *Star*, Dec. 30, 1871.

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THE INSTITUTION OF CIVIL ENGINEERS.

The opening meeting of the new session of this Institution was held in Great George street on Tuesday evening when the paper read and discussed was on "Pneumatic Dispatch Tubes—the Circuit System," by Mr. Carl Siemens, M. Inst. C. E. The chair was occupied by Mr. Vignoles, F.R.S., the President. In April, 1863, the Prussian Government applied to Messrs. Siemens and Halske, of Berlin, to suggest a system of pneumatic tubes for that city. That firm proposed laying tubes, arranged in circuit, to be traversed by a continuous air current always kept flowing in the same direction. The peculiarities of this system—namely, the continuous current of air and the power of putting carriers into the tubes at any point—gave it great superiority over previous systems in the amount of work it was capable of doing. The Central Telegraph Station and the exchange of Berlin were connected together on this system in 1865, by means of two parallel lines of drawn wrought-iron tubing, of two and a half inches internal diameter, one tube being used exclusively for the passage of carriers in one direction, and the other for carriers going in the opposite direction. The continuous current of air for these tubes was produced by means of a steam engine working a double acting air-pump in the basement of the telegraph station. A minute account was given of the experimental circuit laid by Messrs. Siemens between the Central Station in Telegraph Street and the General Post Office in St. Martin's-le-Grand, which was opened for traffic in February, 1870, and had subsequently been extended to Fleet Street and to the West Strand office. The different Stations were connected by two lines of wrought iron tubing, having an internal diameter of three inches. Both lines were laid in the same trench, at a depth of about 12 inches below the pavement, and parrallel to one another. The tubes forming the circuit were of an average length of 18 feet 8 inches, a common lead-and-yarn joint making the connection between each tube. A current of air was kept constantly circulating through the tube by means of a steam-engine and double-acting-air-pump placed in the basement of the Central Telegraph Station. Each station on the circuit had two sending and receiving instruments one on the up and one on the down line of tubes. The carriers for the reception of telegrams, letters, &c., consisted of small cylinders made of gutta-percha, papiermache, or tin, covered with felt, drugget or leather. It was found in practice that the carriers need not fit the tubes at all accurately. Mr. Culley, M. Inst. C.E., chief engineer of the Post Office Telegraphs, had adopted the block system, such as was used on railways for working the tubes. Various tables of formulæ and results were referred to and explained. The total length of line now working in London, from Telegraph Street, to the West Strand office and back, was 6,890 yards. It was found by experiment that the speed of the carrier was much greater as it approached the vacuum end of the tube than it was at the other end. The necessity of having a steam-engine with air pumps and reservoirs was a great hindrance to the general introduction of pneumatic tubes, but this inconvenience had been succesfully removed by the construction of an exhausting apparatus working by the direct action of steam upon a current of air. With one of these exhausters a vacuum equal to a column of 23 inches of mercury was obtained with a less expenditure of steam than would be required to work a steam engine and pump to effect the same object. The principal recommendation of the steam exhauster, besides its extreme simplicity and the small space it occupied, was its cheapness of construction, as the cost only amounted to about one-twentieth part of an engine and pumps. Up to the present time, so far as the public was concerned, the pneumatic tubes in London, Berlin, and Paris had only been used for the conveyance of telegraphic messages, but the British Post Office authorities had already considered the question whether it would not be advantageous to have the letter post service in London executed by means of pneumatic tubes. With such a system of distribution an accumulation of letters at principal offices would be entirely avoided.

ELECTRICAL ANEMOMETER.

A new form of anemometer, the invention of Mr. J. E. H. Gordon, has just been constructed by Mr. Apps, and seems likely to prove of material service to all who desire to notice and record the direction and velocity of the wind. The instrument was briefly mentioned in the *Times*, last April, in the report of a *soiree* given by the President of the Royal Society, but the one there exhibited was in some respects incomplete. As now made, the anemometer consists of an ordinary pair of Beckley fans and a set of revolving cups, fixed in any convenient situation, and connected by insulated wires with a galvanic battery and with a recording apparatus. There is no limit to the length of the connecting wires, so that, for example, recording instruments at Lloyd's might be connected with fans or cups at any part of the coast. The recording instrument itself consists of a clock, a wind dial, a reel of paper, and an endless band carrying a carbon paste for printing. The dial indicates the direction of the wind, and the printing band prints this direction every half hour. The same band records every quarter of an hour of time and every completed mile that the wind has traversed. The slip of paper issued by the machine is about an inch broad, and it receives the time on its left-hand margin, the direction of the wind on its right-hand margin, and a dot for each mile on a central line, so arranged as to be comparable with the time record. The number of dots marked on the paper between 10 and 11, for example, indicate the velocity of the wind during that period of time, and the dots become crowded as the velocity increases, and stand farther apart as it decreases. The battery is composed of zinc and carbon elements, with dilute sulphuric acid, and will work for six months without attention. The reel of recording paper holds a supply for three months, and the clock can be made to run this length of time without winding; so that the whole apparatus would be as nearly as possible self-acting. Ordinarily, however, it would be desirable for the attendant in charge of it to date the recording slip every twenty-four hours, and an eight-day clock would be sufficient for the requirements of most observers. The great advantage of the instrument is in the character of its record, and in the fact that the electrical communication does away with the use of cranks and shafting, which are not only costly and heavy and far less delicate, but which also render it necessary that the recording instrument should be in the immediate neighborhood of the fans.—*Times.*

A GENERAL meeting of the China Submarine Telegraph Company has been held at the Cannon street Hotel, London. The report stated that the line had now been opened five months, and was earning a dividend at the rate of 6 per cent. per annum.

THE British Australian Telegraph Company have received a telegram from Captain Halpin announcing the successful laying of cable from Port Darwin to Banjoewangie, in the island of Java.

A MODEL OPERATING TABLE.

To the Editor of the Journal of the Telegraph:

It is two years since the first circular stand-up operating table was constructed, necessity was the maternity. The room, in which had to be worked 7 wires with an instrument on each, was only 13 feet square. The table is a circular disc, 6¼ feet diameter and stands 39 inches from the floor. The results attained through its peculiarities are various. A large portion of the through business has been forwarded (repeated) to the next office while still coming from the first. A still larger portion has been forwarded within a minute or two of its receipt. Crowded wires and sometimes short force, with a sprinkling of offices, hard to raise, have been the main drawbacks to still better results. The table has now eight wires, and upon these we reach 59 offices direct, and some of these offices we can reach on 2, 3, 4, 5, 6 and one on 7 wires. Without turning the head one can watch the chances for an idle circuit on every wire running into the office wanted, when the receiving operator gets as far as the destination he calls it out loud enough to be heard by all, and when a message is taken at the counter, the private signal of the office to which it is to go is spoken the moment it is ascertained, so you see that a message must have a poor chance for a rest if there is an operator who is not engaged.

Above the table is a light wheel 4 feet in diameter. This revolves easily, and is divided into eight sections with hooks and names of offices, each section over its appropriate instrument, when not being moved to take off or hang up a message.

There are four other wires in the office, three of which we work, these have 37 offices, most of them not on any of the round table wires. The messages destined for points on these wires, are also hung on the wheel, so that every operator in the office knows at all times, without even turning to see, for which and for every office we have business, for all constantly face the wheel and no one can well escape seeing the very play of expression upon the countenance of the other operators.

As we are all good looking, this is not disagreeable. Standing was, at first, very tiresome, so we got a couple of stools that we might rest. *Now* the stools are, for the most part, entirely abandoned. I find that the less the height of the heel to my shoe the less the fatigue, so I have let my heels run down almost even with the sole. I am never so tired, at the close of my work, as I used to be after sitting all day. I think we all enjoy better health than if we were more sedendary. I hope to see the President of the Company come to look at it, and now, though I have before described this in the JOURNAL, let me make you a drawing of it. Very respectfully, * * *

NOTE. We may give a wood-cut of this table in some subsequent number.—*Ed.*

It is manifestly impossible for us, or for any news paper in Japan, to obtain exclusive telegrams from Europe at the existing rates. Added to this, there is the fact that the *Straits Times Extra*, which, before the completion of the cable to Hong Kong, published very full telegrams, is now only able to furnish the most meagre information, and that of a by no means recent date. The merchants here are naturally not inclined to increase their expenses by subscribing for any but commercial telegrams, and these latter they get privately from their correspondents at home, and, under these circumstances, we have every right to call upon the telegraph companies to permit of such arrangements being made as will enable us and other journals in China and Japan to publish full telegrams on the arrival of every mail.—*Yokohama Mail, Oct.* 31.

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FAMILIAR TELEGRAPH TALKS.

We don't get on very fast, so far, with these talks, and it is just as well, for there is plenty time before us, and, at school, we believe in short hours, pleasant lessons and lots of holidays. In our last we were learning the alphabet, Professors Smith and Pope doing the talking for us. We had an objection from Bangor, Maine, about the correctness of the semi-colon, but we gave it as employed here and presumeably correct.

It is a very curious thing, in connection with the manipulation of the key, that even here, every one has such an individuality of thought and motion that, as in the use of the pen, where a thousand men will each make the same letter so differently as that each handwriting shall be recognized, so with the key, the touch shall tell who is manipulating it. We remember well returning one afternoon from New Orleans to Louisville, Ky., walking into the operating room while one of the eastern operators was absent, we sat down, called G., and sent two messages then on file. We gave no signal to denote our presence there. We had been absent many months. We had not touched a key for a year or more. Yet as soon as we had finished the response came back, "O. K. 73, to you J. D. R. how are you?" A little surprised we asked how it could possibly be known that we were at the key? "Oh," was the speedy response, "we know your writing anywhere." Now this seemed very curious to us then. We were conscious of no peculiar manner of forming letters except that we attempted to make the letters as near correct as the type. Yet our case was not peculiar and we are told that each operator seems in some subtle way, distinguishable to the ear, to prove whether Tom Jones, or John Smith, or Jim Compton is working at the key.

It is another curious thing against which we feel like protesting, that to learn to form letters by the register, which we have insisted upon as necessary to their correct formation, is to unfit the learner for sound writing and reading. This, we confess, is beyond our comprehension and stultifies our judgement. Yet it is not more curious than that on some lines, if a message were sent with mathematical correctness, the dots and lines sharply defined, it would not be understood. We have seen recorded messages manipulated by first-class operators which we could no more decypher than Sancrit, but which were quite intelligible to the receiver. We don't like this to be the case. It is making a kind of Scotland of the telegraph, where every few miles you travel you find the language in some peculiar way changing, until from the softened english of the metropolis you reach the jaw-breaking patois of the highlanders. We believe in sticking to the original standards with scrupulous care and fidelity.

Well, we are a little hurried this week and will be brief. We have learned the alphabet carefully, and learned to communicate in the only way in which it can be thoroughly mastered, by keeping up a communication with some one on a wire circuit, not necessarily in transmitting business, but in keeping up animated conversation so as to remove all fear although preserving the care in the use of the key. An office is applied for and obtained, and now it is the business of the new operator to look round him and see that he has fair play, and that he has a fair chance to use the knowledge he has thus far obtained.

The post assigned him is a way office. The line passes in front of his window. To connect him with the offices of the line the wire is cut and a glass nob is inserted to break the connection so as to establish it through the office. It is deemed quite good enough by the agent sent to do the work and no doubt many deem it so, it is done so commonly. Now, young operator, go out and see that at this point you are not placed at a disadvantage. From the one side of that glass nob to the other there is a separation of the main wires of only two inches. When the current is made to traverse your office, before it reaches the terminals of the main wire at the knob, it will have had to travel the equivalent of at least half a mile even with a magnet of low resistance. The one route is 15,000 times longer than the other. Electricity likes a short cut as well as a man. It will take it if it can. It is your interest that not a particle of current crosses these two inches. Every flicker across that narrow bridge is against you, for it cheats you out of your working material. What will you do about it? Well, if you cannot prevent the connection been made in this way, persuade the agent to have two knobs inserted as far apart as possible, and instead of wire being used to hold the two knobs together, use, if you cannot do better, a tarred rope giving it a good coat before you leave it. We would not be content with even that. We would in some way plant a roof over both knobs so that they might be perfectly protected from rain. They cannot be kept from sweating when the air is warm and moist, for the cold glass will condense the air upon their surface, and that is the sole objection to glass as an insulator, but the coat of water given by the falling rain can be prevented. A little ingenuity will accomplish this. The loss by moisture at every point is the lesson of this talk. Let the wires be brought, if possible, to brackets on either side of the window where the brackets having been well soaked in parrafine and the insulators kept clean and covered this first evil is prevented. It is at such points where we deem the form and composition of the Brook's insulator or others bearing a high test and of a form to shed the water easily and freely are invaluable. One on each side of the window afford guarantees against hurtful escape.

One word more on this subject. Let the main wires be brought, if possible, inside of the office before the copper office wires are attached. If not, let great care be taken to see that the connection outside be carefully and thoroughly soldered.

We have personally been put to so much annoyance, from carelessness in making this very connection, that we advise every manager of such an office to see that his is thoroughly done.

A BEAUTIFUL TESTIMONIAL.

One of the most thoroughly surprised persons that last Christmas or any other Christmas morning ever dawned upon, was R. S. Fowler, Esq., Superintendent of the Iowa division of the Illinois Central Railroad Telegraph Lines. He was at his post on Monday morning, the same as other mornings, together with all the employes of the office, except Mr. E. Sholes, the report operator. About nine o'clock Mr Sholes made his appearance, and his first words to Mr. Fowler, were:

"Mr. Fowler, I wish you a merry Christmas. In behalf of many friends, I present you this watch and chain."

With this laconic address, he handed Mr. Fowler the watch and chain, and a paper headed as follows:

"TESTIMONIAL TO R. S. FOWLER.

"Please accept the accompanying watch and chain as a slight token of respect, appreciation and esteem from your many friends, who hope it will prove acceptable as well as useful. All unite in wishing you many happy returns of the day."

Following the above were the names of the donors, some ninety in number, comprising nearly all the operators belonging on the line.

Mr. Fowler was not only thoroughly surprised, but completely astounded; in short, there is no word in the language strong enough to express the utter unexpectedness of the whole affair. After a little, however, he managed to make his emotions of gratitude and pleasure understood to those in his immediate presence, while the following brief letter was transmitted along the line to each operator:

DUBUQUE, Dec. 25, 1871.

To my Friends:

The reception of so elegant a testimonial at your hands is indeed a pleasant surprise. I can but return you my most heartfelt thanks, and my sincere hope that the pleasant business and social intercourse between us, which has been uninterrupted for more than five years past, may continue through the return of many a merry Christmas!

Very truly yours, R. S. FOWLER.

The watch is one of the finest, if not absolutely the finest, ever brought to Dubuque. It is a masterpiece of the "United States Company's" workmanship, made at their celebrated factory at Marion, N. J., expressly for this occasion. It has ruby pallets, jewels set in gold, nickle plate, enameled and frosted, and an eighteen carat case, with vermicelli engraving. On the front is the monogram "R. S. F.," most beautifully designed and engraved. On opening it, upon the inner cover of the works is the inscription—

"TO
R. S. FOWLER,
From his Telegraphic Friends:
Dec. 25, 1871."

The chain is eighteen carats fine, heavy, and of beautiful design and perfect finish. The works alone of the watch cost more than $100, and the expense of the whole was about $300. It was procured through the firm of E. A. Giles & Co., to whom is due much credit for the handsome way in which it was gotten up.

This is a case in which the gift is in every way worthy of the receiver, and the receiver of the gift—as not only his subordinates, but the public, who have daily dealings with the telegraph office, and have uniformally found Mr. Fowler always gentlemanly, prompt and painstaking, will unanimously agree. The recipient will constantly bear about with him an unsolicited testimonial of respect and esteem, of which he may well be proud so long as life shall last.

The Riband Telegraph Pole Company are erecting extensive works at New Islington, Manchester, and putting down plant capable of turning out 500 poles per day.

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RESIGNATION OF MR. CHAS A. TINKER.

WASHINGTON, D. C., January 11, 1872.

To the Editor Journal of the Telegraph:

It having been rumored that manager Tinker had resigned his charge of the Washington, D. C., office, which rumor was subsequently confirmed by the appearance of the following circular:

WASHINGTON, D. C., January 9, 1872.

To the Operators, Clerks and all other Employes of the Western Union Telegraph Company, Washington, D. C.

Unexpected inducements opened to me elsewhere, have prompted my resignation of the Managership of this office, but before closing my official career, I desire to express thanks to my many associates for their generous support and faithful adherance to duty, to which is due the little success I have met with in the conduct of the various and oftentimes trying duties of the position. To each and all I am grateful, and very many regrets swell my heart at the thought of severing these pleasant relations of nearly five years existence; but the pangs of seperation are half buried in pleasant memories, which will be ever present with me in whatever station my future may be cast.

I have also to announce the appointment of my successors, Leonard Whitney, Manager, and Morell Moreau, Assistant-Manager, both of whom are well and favorably known to all, and I believe you will, with me, accept this selection of two associates to represent the Company, and serve with you in the protection of its interests and performance of the work required of its servants in this office, not only a special mark of esteem for virtues, and recognition of merit, encouraging to all, but an assurance that the affairs of the office are in a satisfactory condition, and a desire that they shall be so continued, under the guidance of experienced heads already familiar with them.

I bespeak for my worthy successor and his able assistant, the same cordial co-operation and support in their management which you have extended to me.

I shall leave you in a few days, conscious of having endeavored to bear faithfully my responsibilities to the Co., dealing justly with all, and cherishing a pride in my companionship with its employes of the Washington office.

Very truly yours,

CHAS. A. TINKER.

The employes conceived a plan for making some substantial manifestation of their friendship and regret at his departure, and did most successfully and happily execute it on the evening of the tenth instant, by a visit to his residence, *en masse*, bearing in procession a valuable silver service, consisting of a tankard, goblets, bowl and salver and a tea service of six pieces, exquisitely wrought, the tankard bearing the inscription, "Presented to Chas. A. Tinker by the employes of the Washington, D. C., office of the Western Union Telegraph Co., January 10, 1872," each additional piece bearing the monogram C. A. T., neatly engraved. The presentation speech was written on the initial leaves of a beautifnl autograph book, each following leaf bearing the autograph of one of the participants in the gift. The speech was gracefully made by operator James B. Austin, of the main office, as follows:

THE PRESENTATION SPEECH.

MY DEAR SIR:—As you are on the eve of severing your connection with the Western Union Telegraph Co., as its manager in this city, we cannot withold the expression of our regret in parting with you, perhaps never again to be associated in business relations. There may have been occasions when our dispositions, like the telegraphic wires in inclement seasons, have been unfavorably affected, but like the return of good weather and the manipulation of a skilful hand, there was the resumption of all the amenities which should characterize gentlemen engaged in the same pursuits. It is always at the moment of parting that we feel more strongly than we do at other times, that our association has been more pleasant than when we had no thought of seperation. We doubt not, in your distant home, you will often recur to your management in Washington, and though you have had sorrow and affliction, you will doubtless recall much of pleasantness which has attended your residence in this city. We join in the expression of the hope that your new vocation may not only prove agreeable, but profitable, and that you may enjoy a full measure of health, without which, there can be no enjoyment of wordly prosperity.

We ask your acceptance of the accompanying articles, which may serve additionally to remind you that you are held in kind remembrance by those who have been associated with you.

While all listened in perfect silence, but inwardly enjoying the predicament, into which, this time, they had entangled the wits of their manager. Mr. Tinker accepted the articles in a few words, indicative of his extreme happiness, best expressed in the surprise and pleasure depicted in his countenance.

Mrs. T. had been quietly advised of their plans, and exhibited her preparation by an invitation to the dining-room where a table was found abundantly provided for the occasion.

The evening was spent delightfully. Each hour passed *merry as a marriage bell* until midnight brought the "good night." It was an occasion long to be remembered by the forty, or more participants.

Mr. Tinker leaves us to enter upon the duties of General Train Dispatcher for the Vermont Central R. R., the position made vacant by the sudden death of the late Mr. Randall, referred to in a previous number of the *Journal*. His successors have entered upon their duties, and though we regret the loss of our late manager, we greet the new with a hearty good will.

VIVO.

NOTIFYING NON-DELIVERY OF MESSAGES.

MADISON, N. Y., Jan. 8, 1872.

Editor Journal of the Telegraph:

When I send a message to an office and get O. K. from it, and that message is not delivered, and no office message is received stating that it cannot be delivered, have I not done my whole duty? Is it not the duty of offices receiving messages, and who know they cannot be delivered, to notify the office from whence they was sent? The reason I ask is, that nearly every day some one comes and complains that their message were not delivered. I am new at the business and wish to understand my duty. M.

Answer. Rule 53, page 27, is as follows:

"In case of non-delivery, the reason in writing must be given by the messenger to the delivery clerk, who will notify the office from which the message is received, and will also make a record of the same on the envelope of the undelivered message."

Rule 56, page 27, reads as follows:

"Whenever messages cannot be delivered, in addition to notifying the office from which they were sent, notice should be given through the post-office written upon blank No. 26."

We feel conscious that neglect of this and similar rules, operate greatly to the disadvantage of the telegraph system, and whenever neglect is clearly proven, there should be such a reprimand given as will at least convince the offender of the extent to which the company feels the injurious character of the offence.

AUGUSTA, Maine, Jany. 2, 1872.

To the Editor Journal of the Telegraph:

DEAR SIR:—If Mr. Kelchner would correct a slight error in his communication, he would present a much stronger case. To read the numerous articles on this subject, one would suppose that the very existence of the W. U. Telegraph Co. depended upon the tariff and form of message being tinkered to please the public. Let us first do WELL what we have to do. It is not so much the tariff or the form of the message that the public have to contend with, there is trouble nearer home, which might be remedied in a great measure. First, there is errors; secondly, delays; thirdly, but not lastly by any means, is the necessity of having to send two or three office messages requesting answers to messages sent. Now here is something that operators and managers have right in their own hands to please the public with, and to increase their companies business, these evils can be in a great measure remedied, but it is in the hands of the operators and managers entirely; there is a way in which the Company can handle this matter, but it will take time to do it. Amongst the existing evils, and which is indeed the great cause of the three spoken of above, is fast writing and improperly spacing, attempting to write fast before learning to write slow, not being in fit condition to send or receive a message; lack of discipline on the lines; indifference and carelessness of operators in general.

ONE WHO SEES.

WE regret that a carefully prepared article describing the new St. Louis Headquarters of the Western Union Telegraph Company, reached us after our last was made up, and which would have taken the place of the one given from the St. Louis Democrat. We give the following which did not appear in that article.

THE ST. LOUIS STAFF.

District Superintendents Office.

R. C. Clowry, Superintendant 2d district.
J. McMichael, Chief Clerk and Supply Agent.
Jas. P. Cassidy, Assistant Clerk.

ST. LOUIS OFFICE.

E. H. Brown, Manager.
W. W. Osborn, Bookkeeper,
Thos. F. Tierney, Assistant Bookkeeper,
H. E. Losey, in charge of Commercial News Department,
Jno. A. Hobbs, Receiver,
A. E. Haquette, Assistant Receiver,
Jno. L. Rand, Assistant Receiver,
Jos. T. Holohan, Delivery Clerk.

Jno. C. Hanchett, Chief Operator,
Chas. W. Hammond, Assistant Operator.

OPERATORS.

Albert E. Van Tyne,	E. J. Stevenson,
Kit Dougherty,	M. G. Chettle,
E. L. Parmelee,	Chas. F. Benett,
Jas. W. Cooke,	Jno. H. Crane,
W. W. Cummings,	Jas. L. Cassidy,
J. G. Edwards,	M. D. Crain,
M. C. Hart,	S. B. Fairchild,
Joseph Purcell,	Jas. P. McClure,
Wm. A. Leary,	E. O. Martin,
R. H. Boble,	Wm. A. Hobbs,
Chas. Maginnis,	Jno. J. Reilly.

NEW RAILROADS.

Quincy to East Louisiana, Ill.

Kalamazoo to Smyrna, Mich.

Chicago to Dubuque, Iowa.

The Missouri, Kansas and Texas road will open Texas to the west and north early in June next, and is regarded as a very important road.

St. Louis to St. Paul, 502 miles by the Burlington, Cedar Rapids and Minn. R. R., has been opened to the public.

Keokuk, Iowa to Nebraska city.

PRINTING TELEGRAPH.—Richard Herring, of Canonbury, Eng.—This invention relates to that class of telegraphic printing apparatus in which the signals are effected by printing or marking dots and dashes or short strokes on a band or strip of paper as it travels through the apparatus. The object of the improvements is to increase the rapidity of transmission of the printed signals, and to simplify and facilitate the manipulation, and to render the signals easier to read and less liable to error. To this end, instead of making the dots and signals run in a line, the dashes or strokes are arranged in a verticle position. By this means the signal can be read with great facility. It takes up less space, and, it is claimed, can be transmitted with greater rapidity than the old style of signal. To effect this object a style or instrument of peculiar construction is employed. As it is composed of separate parts or styles, it may be termed a compound style. One of these parts is made in the form of a blunt, round point, so as to make or print a dot. The other part of the style is made with a long narrow edge, so as to form or print a dash or stroke; or, by means of any combination or construction of the style or styles, any other signs which may be deemed preferable to adopt may be used. In any case, the two parts are operated by seperate currents of electricity or by distinct magnets.

A LARGE quantity of matter is necessarily laid over until next issue.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JAMES D. REID, Editor,

Executive Rooms, Western Union Tel. Co.,

145 Broadway, New York.

NEW YORK, JANUARY 15, 1872.

INCIVILITY.

The text is not agreeable and we would rather select another. But to preach acceptably there must be the pressure of some vital thought which demands utterance. Our desk covered with com plaints of the character indicated by our title, one of them ten folios long, obliges us to say a word respecting them. We cannot publish them all. One of the mildest, from Augusta, Me., is given. We must have condensation if parties would have a place in the JOURNAL. Yet we take up the subject of them all when we say, that there is evidently on the part of some, it may be of many, a style of performing their duties, which indicates a low and reprehensible conception of the nature of their business, and of the treatment due to associates in labor.

Here, for example, is an operator, anxious to do his duty. He sends a message to an office, but does not hear, or thinks he has not received the acknowledgement. He is not satisfied unless sure of its reception, and asks, politely, "did you get my message?" or some other such respectful inquiry. A sensible man would at once respond, "O. K," and thus at once relieve anxiety. But how harsh it comes, how offensive, to have flashed back, "mind your business, and don't make me answer twice." *That* man ought to be charged, at least, the price of a message. Or an operator sends a message containing some anxious inquiry. The sender lingers round the office counting the minutes and the laggard hours as they pass. The operator, after waiting a reasonable time, ventures to call the distant office, and inquire if answer has been received. His anxiety to satisfy the customer may be excessive, but it is an anxiety which every true man must, more or less, feel. The mere answer "no," would perhaps relieve it. But how does it make the teeth meet, when the unseen bear growls back, "shut up, you will get your answer when it comes." We would like to believe there were no such men; we would be glad if we could "shut" them all "up." We would like to give such a man a night on an iceberg with a polar bear as an initial dose. It might give him proper *polarity* if he escaped unchoked. Incivility on a telegraph line, is simply detestable and cowardly.

And the trouble is, that these vulgarities are secret sins. An operator is not willing to report any such conduct, however mean, even when he knows that the business is made to suffer. So he is silent, and the bear lives. We often contemplated a plan to check all this, when lines were under our management. We thought once of a plan, by which all communications would register themselves, so that the whole manner of official intercourse would be revealed, and a remedy be thus swiftly applied. We took, however, another course—Listen!

Near where we write is a restaurant, the principal is rich and domineering, he talks to his waiters as if they were dogs. What then? Only this, they are dogs to each other, snapping and growling curs, between whom no civil word passes from morn to night. The men are the master in hash, and we scarcely blame them; it is so everywhere. Like produces like; it is the correlation of forces.

Well, we must speak our experience sometimes, even if we be called egotistic therefor. We tried the correlation the other way. We visited the offices frequently, sat down at the desks of our men and helped them. We dropped into their households now and then; we hailed them from the platform, and kissed our hand to them. Ladies will please notice we said "hand." We shook hands with the messenger boy, as his pleased face lit up with a smile, which followed us to the cars. Not unfrequently in Cincinnati, in Louisville, in New Orleans, we accompanied each other to church. Ha! ha! ha! We see some executive officer smiling at all this. Very well. It worked well enough. We had no shirks and no bears; they went elsewhere. By its power, we kept up a supervision from New York to New Orleans, in which the elements of courtesy and vigor equally shone, not in us, but throughout. We believe in the system. There are many men doing today, what twenty-five years ago we began. There are no hogs in their whole district. There is combined the utmost vigor, with the most perfect respect. Advocates of government telegraphs don't live in their region. We commend the medicine. We have seen "how the new thing works."

As all railroads as soon as completed are at once regarded as post roads, the Post Office Department is, of necessity, kept fully informed of the progress and completion of all railroad enterprises. This information embraces not only new independent roads, but also all branches and extensions of old routes. Nothing more clearly exhibits the enterprise of the country and the progress of the population. Few people are aware of its extent. In no single period has it been so marked and extensive as during the months which closed the now departed year. December far exceeds the average of any former month. The following figures are sufficiently remarkable and need only to be stated to give some idea of the energy which pervades the country. In fourteen States, twenty-nine railroads have been completed, forming new post routes, in all 968 miles of railroad completed during the month, and there seems no signs of the least abatement. Before us, as we write, lays the *Railroad Gazette*. It is the most royal and ample weekly which reaches our desk. Let us turn over its pages. There are page after page of the record of railroad improvements and the progress of invention. All is fresh, animated, sparkling, stimulating. Then we come to the history of railway progress. It is headed "Roads, Old and New." Column after column it gives the details of roads just completed and open for travel; roads in progress; roads projected; roads needed. In short brief articles, two or more pages are commonly filled. Nothing could better indicate the push and swell of population, the growth of public demand for enlarged commercial transit.

And some one asks for the hundredth time, "what has a telegraphic Journal to do with this?" We need scarcely answer. No road can now be built without a telegraph along side of it, if it would escape scorn and disaster. The history of railroads must be ever, more or less, associated therewith. A railroad means not only a postal route, but a line of telegraph as well. This always, and by the very necessities of the case.

Hence may be seen the necessity of constant provision, by a company like the Western Union, for the means of enlargement. One thousand miles of railroad opened in December, means one thousand miles of telegraph added to the American telegraphic service. And so it must be ever if a great company would be true to itself and the public. It cannot afford to stop its work. To cease the processes of enlargement, while civilization surges its big waves on every side, is to die.

"*Only this, and nothing more.*"

A number of articles have been set afloat intimating a design on the part of the British government of gaining possession of the Atlantic cables. In others the government of the United States is included in their proposed control. If there be, indeed, any proper sphere in which governments can work in telegraphic enterprises, as we have taken occasion to say more than once in these pages, it is in the matter of planting and maintaining Ocean cables for international correspondence. We were induced to say so from their great cost, their doubtful continuity, and the exposure of capital involved therein, as well as to insane competition started by cable contractors—imperilling all investments therein. Governments could afford, in the general interest of civilization, to make a sub-oceanic transmission practically free, maintaining the conductors from coast to coast, leaving internal arrangements to private enterprise on certain defined conditions. We see, however, no immediate indications of such a result, unless this be what Mr. Field meant in his Rome speech, when he spoke of the necessity of appealing to governments for aid in developing and maintaining the great telegraphic connections of the world.

VOLUMES 3 and 4, Journal of the Telegraph neatly bound, can be supplied. Price two dollars each.

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THE NEW NEW YORK OPERATING ROOM.

On Thursday, January 11, at 4 P. M. in presence of the Executive Board and Officers of the Western Union Telegraph Co., and representatives of the New York Press, the new operating room described in a former issue was taken possession of by the operating force. The switching from the old room to the new was a complete success, and the business experienced no further interruption than the time needed to reach the new quarters. Steam was at once applied to the tubes copying presses and printing instruments and all went off charmingly.

After the guests had had time to comprehend that the transfer had been effected, business was stopped while President Orton addressed those present as follows:

MR. ORTON'S ADDRESS.

GENTLEMEN—I take this occasion, now that all are comfortably seated in this new and elegant apartment, to return thanks, in behalf of the company, to the General Superintendent, the Superintendent, the Managers, and all who have in any way aided the completion of these beautiful and unique arrangements. They are the result of twenty years experience in the developement of the telegraph system of this Continent, and typify the skill so far attained. What another twenty years will develope time can alone reveal, and for it we must wait.

To those who perform the toil connected with the service of this apartment I desire to say, that I trust all will see in these arrangements and in the beauty and comfort of this room, the design of the officers of this company to do all that can be done for the welfare of those who serve them. If gentlemen, you will in the future give us the vigor and the cheerfulness and the skill which has marked your past service, I feel assured that we shall together build up a telegraphic system of which we shall all feel proud, which shall abundantly satisfy the public demands, and make it so proper a trust that even the Government will refuse to take it from our control.

We congratulate Gen. Eckert and all his aids on this most successful work.

The War Department, in addition to its weather-signal system, is about to establish an electrical social system of storm signals in all the larger cities of the country, by which every man who is on the magnetic belt can, by watching the signals on his chimney-top or ridge board, tell the moment when it will be safe for him to leave port (or champagne) for home. A black flag flying will signify "cross as a bear—typhoon approaching." A white flag—"everything is lovely; she is asleep." A red flag, with white centre—"look out for squalls; baby just spanked." While a white flag, with red centre, indicates simply "cautionary" measures on the part of the "old man," who can go home under full sail, but should reef his boots and douse the binnacle lamp before going up stairs.—*Titusville Herald.*

The annual meeting of the Nova Scotia Telegraph Company was held January 10th at Halifax, when the state of the lines and the operation of the lease to the Western Union Telegraph Company were reported as satisfactory. Legislative action had been secured to protect Nova Scotia from breach of charter by Dominion Co. The directory of last year was re-elected. Officers will be chosen at a meeting to be held at close of the month.

W. H. WISEWELL.

LONDON, Jan. 1, 1872.

Mr. Cyrus W. Field entertained the members of the Telegraphic Conference assembled in Rome at a banquet given in that city to-night.

There were present in the hall the representatives of twenty-one countries, or six hundred millions of people, and of twenty-six different languages.

Private companies were represented to the amount of 300,000,000 francs.

Mr. Field delivered an eloquent address, in the course of which he invited the members to a reassemblage of the Conference in St. Petersburg in the year 1875.

The other speakers, with Mr. Field, urged the necessity of union and of aid from the governments in the cause of telegraphic communication.

A Telegraph Conference will be held in Naples to-morrow.

A NEW demand having arisen for POPE'S MODERN PRACTICE OF THE TELEGRAPH, the publishers have left copies in our hands to meet orders addressed to us. A copy will be mailed, post paid, on receipt of two dollars.

THE Sioux City and Pacific railroad telegraph office is now in charge of George W. Gardner, aged 11 years, late of Fremont, Nebraska, where he graduated as a first-class operator, after eight months service as messenger boy. Have you any smarter boys than this? If so, trot them out.

Referring to the charge against Mr. Scudamore of stopping Press dispatches in order to crush the recent attempt at a strike among English operators, the London correspondent of the *Tribune*, G. W. S., says:

"A correspondent has brought out the fact that Mr. Scudamore, in recently intercepting telegraphic dispatches, committed an offence not merely against morals and decency but against the law. The Telegraph Act, under which the Government acquired the lines, provided that anybody in the post-office who should, contrary to his duty, disclose or intercept any message, shall be deemed guilty of a misdemeanor, and upon conviction be subject to imprisonment for a term not exceeding 12 months. Under that act I do not see why Mr. Scudamore may not be tried and sent to jail like any other offender. If an officer of a private company had done a like thing, dismissal would have been the certain penalty, and, in so aggravated a case, prosecution would almost certainly have followed. In a government officer the guilt is far greater, but I suppose we must wait till Parliament meets before so much as a complaint would have a chance of being listened to. Possibly somebody may say that Mr. Scudamore, when he read and delayed a newspaper dispatch, was not acting "contrary to his duty," but in pursuance of it. If that is to be the defence, it must be stated in Parliament, and if stated, the Government of which Mr. Scudamore's chief, the Postmaster-General is a member, must either adopt or repudiate it. I will undertake to say that either the Government or any single Minister who ventured to adopt it would be driven out of office with hootings before 24 hours were over. But the fate of Sir James Graham is too fresh in Ministerial minds to permit such a blunder as that. Mr. Scudamore's interference will be disavowed, and I suppose some sort of excuse will be made for keeping him in office."

TRANSFER SERVICE.

MONEY ORDER OFFICES TRANSFERRED.

Ballston, N. Y. Cohoes, N. Y. Glen Falls, N. Y. Hoosick Falls, N. Y. Manchester, Vt. North Adams, Mass. Saratoga, N. Y.	From G. W. Gates' District, to J. C. Hendrickson's District.
Logansport, Ind.	From J. J. S. Wilson's District, to J. F. Wallicks' District.
Evansville, Ind.	From G. W. Trabue's District, to J. F. Wallicks' District.

MONEY ORDER OFFICE CLOSED.

Orange, N. Y.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY.
145 Broadway, New York,
January 15, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since Jan. 1, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

241 Adams, Ind.	112 McKee's, Pa.
21 Auburndale, Mass.	112 Martinsburg, Pa.
378 Bowling Green, Ky.	220 Milford, Mich.
357 Cambridge, Ill.	261 Millersburgh, Ind.
298 Chebanse, Ill.	253 No. Bend, Ohio.
336 Dunlap, Ill.	220 Novi, Mich.
85 Ellicott City, Md., re-op'd	119 Pentwater, Mich.
300 Fort Branch, Ind., heretofore an Other Line office.	300 Princetown, Ind., heretofore an Other Line office
* Fullerton, Pa.	300 Patoka, Ind., heretofore an Other Line office.
* Fargo, D. T.	378 Pike, Ill.
112 Henrietta, Pa.	378 Pleasant Hill, Ill.
300 Hazleton, Ind., heretofore an Other Line office.	358 Pearl, Ill.
346 Hampton, Ill.	41 Roselle, N. J.
484 Jewett, Texas.	254 Stanford, Ky.
367 Lost Nation, Iowa.	66 Tuscarora, Pa.
378 Laddonia, Mo.	378 Vandalia, Mo.
119 Ludington, Mich.	220 Wixom, Mich.
119 Manistee, Mich.	336 Wyoming, Ill.
283 McLeod, Ky.	76 Wernersville, Berks Co., Pa.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.	*Leaves this Line.*
Fullerton, Pa.....	15	1 Catasauqua, Pa.
Fargo, D. T.....	230	13 Milwaukee, Wis., check Chicago Ill.

OFFICES CLOSED.

Bastrop, Texas; Brinckley, Ark.; Edgerton, Col.; LaGrange, Texas; Thibode ux, La.; Thompsontown, Pa., and Wilton, Me.

GENERAL INFORMATION.

The tariff to square 119 from squares 297, 306, 307 and 316 will be one dollar; from all others, 20 cents more than to square 269.

The following changes in "tariff for Other Lines" have been authorized: From Plattsmouth, Neb., to Lincoln, Neb., 25 and 2; Columbia, S. C., to Abbeville, S. C., 65 and 4; to Greenville, S. C., 85 and 6, and from Kingsville, S. C., to Camden, S. C., 50 and 3.

The P. O. adds. of Bronsons, Pa., is Shamburg, Pa.

The name of the office heretofore known as American Central Crossing, Ill., has been changed to Alpha, Ill.

The office 59, Rockdale, Pa., in last JOURNAL, is in Delaware Co., Pa.

OFFICES HAVING "SPECIAL SHEET A"

Will check Kingsville, S. C., 10 cents more than "special rate" to Columbia, S. C., and Tuscarora, Pa., 20 cents more than "special rate" to Philadelphia or Harrisburg, Pa.

ATLANTIC CABLE BUSINESS.

We are notified that messages can now be sent to Shanghai and Hong Kong, "via Russia," rate from London $21.50 for 20 words, and half rate for every additional ten or fraction of ten words.

The words "via Russia" must be inserted in the message, but will not be charged for beyond London.

WILLIAM ORTON, President.

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A HANDSOME CHRISTMAS PRESENT.

On Monday afternoon Captain N. M. Booth, the worthy Superintendent of the Ohio River Telegraph Line, who had been ill for a day or two, was aroused from an afternoon sleep, and summoned to his parlor, which he found filled with new and elegant furniture, a present from the various operators along the line, who had contributed to its purchase and had it delivered by the operators at the Evansville office. Mr. Duke made the presentation speech in terse but expressive language, to which Mr. Booth, who was taken completely by surprise, responded in as coherent a manner as possible. It was a handsome gift to a most worthy family.

A NEW SYSTEM OF RAILROAD TELEGRAPHIC SIGNALS.

A novel system of telegraphic signals has just been introduced by way of experiment at this end of the Lowell Railroad. At present only East Cambridge is connected with the Boston depot, but if the workings of the new system are found to be successful and satisfactory through the winter months, it may be adopted along the whole line. A box in the train house of the passenger depot on Causeway street is connected by wires with the office of the ticket master, who, when a train starts, by the pressure of a finger upon a little instrument, displays at an aperture in front of the box a red flag if in the day, or if it is at night time the red sides of a lantern to view. When the engine reaches the rail directly in front of the station at East Cambridge the electric current is opened, and the red flag disappears or the lantern shows a white light. A bell is also rung at the same moment in the ticket office. If this system works well, and is adopted along the line generally, it may easily be so perfected that knowledge of the position of a train may be known at any station which it has just left, and thereby insure comparative safety to passengers.—*Boston Herald.*

Sidney E. Morse, a brother of Prof. Samuel F. B. Morse, the inventor of the telegraph, died of paralysis, a few days ago, in New York city, at the age of 77. He was born in Charlestown, Mass., and graduated at Yale at the age of 14. He subsequently studied theology at Andover, Mass., and law at Litchfield, Conn. He edited successively the Boston *Recorder* and New York *Observer*. Mr. Morse was better known by his well known text-book on geography. He was the inventor of the process known as cerography by which maps can be printed on the common printing press. This art was not patented and has never been made public. Since his retirement from journalism, in 1858, he has been engaged with his son upon the invention of the "bathometer," an instrument to be used in making rapid explorations in the depths of the sea. This was exhibited at the Paris Exposition in 1867, and it is believed will prove useful to science.

A PLEASANT GATHERING.

Yesterday was the anniversary of W. C. Buell's departure from the Western Union Telegraph Company, in charge of whose office in this city he spent many years. He left it to engage in what has proved a most successful venture. Accordingly, last evening his insurance and real estate exchange office, No. 265 River street, was the scene of as elegant a spread, surrounded by as jolly a set of guests as can ordinarily be seen by the unassisted vision. At the head of the table sat Mr. Buell, himself, who presided with grace and dignity. His successor in the telegraph office, the new "Boss," Mr. Prescott, was present with all the lightning manipulaters in the vicinity. Mr. Buell's speech upon the occasion was an effort that brought the old times back to the memories of all and renewed in all hearts the old feelings of friendship. Mr. Prescott's responce was equal to the occasion. It would be impossible to give the happy effect of operator F. D. Adam's telling oratory, or the pleasing reminiscences of Ben. Follet and a dozen others in the company. At a seasonable hour in the evening after full justice had been done to the collation and a basket or two of the "best," the party seperated, wishing for "many happy returns of the same."

A LADY PLEADS FOR DECENCY.

Cadiz, O., Jan. 3d, 1872.

To the Editor of the Journal of the Telegraph:

Living all our lives in this quiet little town off the Railroad, connected with the Telegraph world by a single "loop," we know little of the great world beyond, from which we have only an occasional whisper.—Still we fancy this one of its brightest spots.

We learned the business in this office, and during our two years experience have come to think Telegraphers the best people in the world.

Personal acquaintance does not warrant this partiality. We have seen very few indeed, and they speak so pleasantly over the wire, never forgetting common courtesies; that we very naturally supposed them free from the greater faults—*moral* men, at least.

Unhappily we have lately found a few exceptions. While speaking of the unpleasant fact to our neighbor of same craft, he said, "Why they all either drink, use tobacco, or swear—excepting the ladies."

Now can this be possible? These vices are so common, we cannot hope that they have not some votaries among our profession, and can scarcely hope that a word of ours can do anything toward reforming them. Yet we would entreat all to abstain and forsake them. We have a personal concern for the honor of the craft. Personal character is too valuable to be wretchedly yielding to vices so debasing.

Be a *man* my brother; these vices debase you. Its enough to make an angel weep to see those who might made their lives glorious, slaves to these debasing habits.

No step to ruin is more sure than the first, but it is the easiest to retrace.

"Now is the accepted time"—return, and let us have a "Happy New Year." M.

SABBATH REST.

I look upon the Sabbath day as a day of holy, physical, and mental recreation; I look upon it as a day of which you must devote a good part to the worship and service of Almighty God; but I look upon it as a day that yon may devote to many family affections, to many family duties, to social intercourse, to many little innocent enjoyments; and if there is anything on the face of the earth that to my mind is more beautiful than another, it is on the Sabbath day, under the bright sun and on a glowing evening, to see the working man with his wife on his arm and his children behind him, all disporting themselves under the open canopy of heaven. I ask you now to look at this picture. I know we have it in London, and I hope you have it here in Glasgow. Donald going out of an evening, with his Jeannie upon his arm, nice and neat, in her cap and kirtle, and all the bairns round about them enjoying themselves. Then they go home, then they have to examine the Bible, then they read a chapter of the Word of God, then they join in the common prayer, when they retire to bed, and Donald rises next day and resumes his working clothes, full of confidence and joy, because he knows that he has spent well the Sabbath, and that God will be with him for the ensuing week. It is impossible, in looking over the old race of human life—it is impossible for those who will be candid to admit the truth for them not to see and confess the wisdom of the Sabbath, of the institution of the Lord's day. A rest of one day in seven is so necessary, so true, and so wise, that it could not possibly have sprung from any human origin, but must have come down as a revelation, an ordinance from heaven. Those who are most engaged in works of toil, whether it be of the brain or of the hand, call out for repose, and if it be said that rest is necessary to the human mind and the human body, I ask you if there ever was a period in the history of the world, in the history of this nation, when it was more necessary than at the present moment! Is it not an observation of every one that we are living with immense rapidity? Is it not an observation of every one that we are crowding into a year the events of a century? Is it not an observation of every one that the mad competition of trade keeps every one upon tenter hooks, keeps every one in the furnace, keeps every one in such a state of excitement that the nervous system is shaken? Everybody knows that in the days in which we live, the moral system, the intellectual system, is more greatly disturbed than ever, owing to the wild competition in every department of trade and art in which men's minds are so buily engaged.—*Lords Shaftesbury at Glasgow.*

TELEGRAPHER'S MUTUAL LIFE INSURANCE ASSOCIATION.

RECEIPTS.

ASSESSMENT NO. 24.

15	19	33	51	58	70	90	104	117	136	138
139	171	232	233	251	259	303	327	328	330	372
376	386	447	524	542	605	627	646	649	690	698
712	714	737	738	814	815	825	856	868	870	918
929	941	991	992	994	1061	1099	1111	1132	1133	1136
1137	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163
1168	1173	1174	1185	1186	1187	1188	1191	1192	1193	1194
1195	1196	1207	1212	1221	1026					

Russian Telegraphy.—In consequence of the new telegraphic treaty between Russia and Persia, preparations are being made for the erection of a number of new lines of telegraph. The lines, radiating from a central station at Astrakan, will skirt the Lower Volga and the Caspian Sea.

BORN.

In Pittsfield, Mass., Jan 3d, a daughter to F. M. Marsh, Line Repairer, W. U. Telegraph Co.

A young operator here born to S. O. Campbell, operator, Centretown, Cole Co., Me., a daughter, weight, eleven pounds, December 10, 1871.

To Herbert J. Bresee, manager W. U. Telegraph Office, Suspension Bridge, N. Y., Dec. 29, a son, "first rooster."

MARRIED.

Arbuckle—Swift—At the residence of Mr. H. Wentworth, Christmas Eve., Dec. 24, by the Rev. R. H. Annis, Mr. Frank P. Arbuckle, Agent and operator, Kansas Pacific R. R., Fossit, Ks., to Miss Emma A. Swift, of Fond-du-Lac, Wis.

Hunter—Woolsey—Dec. 20, 1871, at the residence of the bride's father, in Sandusky, Ohio, Mr. J. W. Hunter, manager, W. U. Telegraph Office, at the above place, to Miss Nellie Woolsey.

Rebhun—Lovell—Dec. 5, 1871, at Bunnington Furnace, Pa., by the Rev. N. F. King, of Hollidaysburg, Pa., Chas. Rebhun, manager, W. U. Telegraph Co., Butler, Pa., to Miss Ellie M. Lovell, both of Butler.

Page—Jackson.—Tuesday, January 2d, at Red Bank, N. J., by the Rev. Wm. N. Dunnell, Harry W. Page, of Shiloh, O., operator at Red Bank, to Florence J. Jackson, of Red Bank.

Foster—Van Horne.—At Odell, January 1st, 1872, by Rev. C. J. Collins, Chas. E. Foster, operator C. A. & St. L. Ry. telegraph, to Miss May Ella Van Horne, only daughter of Hon. J. R. Van Horne, of Lockport, Ill.

Skeggs—Mills—At the residence of the brides father, January 3rd, 1872, by the Rev. Edward Torrance. C. B. Skeggs, manager, W. U. Telegraph office, Jonesboro, Ill., to Miss Jennie Mills of Horrodsburg, Ky.

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NORTH-WESTERN TELEGRAPH COMPANY.

TARIFF FROM MILWAUKEE,

TO TAKE EFFECT FEBRUARY 1st, 1872.

On all this business, offices will check CHICAGO, ILLINOIS, and collect our rates to Milwaukee for "this line" Tariff.

Milwaukee, to—		
Adams, Minn.	100	7
Algona, Iowa	125	8
Anoka, Minn.	100	7
Appleton, Wis.	50	3
Arena, Wis.	50	3
Atwater, Minn.	150	10
Austin, Minn.	100	7
Avoca, Wis.	60	4
Bangor, Wis.	75	5
Beaver Dam, Wis.	40	3
Belle Plaine, Minn.	100	7
Beloit, Wis.	40	3
Benson, Minn.	150	10
Berlin, Wis.	50	3
Big Lake, Minn.	125	8
Black Earth, Wis.	50	3
Blakeley, Minn.	100	7
Blooming Prairie, Minn.	100	7
Blue River, Wis.	60	4
Boscobel, Wis.	60	4
Brainerd, Minn.	150	10
Brandon, Wis.	40	3
Brentwood, Minn.	100	7
Bridgeport, Wis.	75	5
Britt, Iowa.	125	8
Broadhead, Wis.	30	2
Brookfield, Wis.	25	2
Burnett, Wis.	40	3
Byron, Minn.	100	7
Calmar, Iowa.	75	5
Cambria, Wis.	40	3
Carpenter, Iowa.	100	7
Carver, Minn.	100	7
Castalia, Iowa.	75	5
Cedarburgh, Wis.	25	2
Cedar River, Mich.	100	7
Centreville, Mich.	150	10
Charles City, Iowa.	100	7
Chester, Wis.	40	3
Chicago, Ills.		
Chickasaw, Iowa.	100	7
Claremont, Minn.	100	7
Clear Lake, Iowa.	100	7
Clear Lake, Minn.	125	8
Columbus, Wis.	40	3
Counover, Iowa.	75	5
Cresco, Iowa.	75	5
Cross Plains, Wis.	50	3
Crow Wing, Minn.	150	10
Darwin, Minn.	125	8
Deansville, Wis.	40	3
Decorah, Iowa.	100	7
Delano, Minn.	125	8
Depere, Wis.	75	5
Dodge Centre, Minn.	100	7
Duluth, Minn.	150	10
Dundas, Minn.	100	7
Eagle, Wis.	25	2
Edgerton, Wis.	30	2
Elk River, Minn.	125	8
Elm Grove, Wis.	25	2
End of Track, N. P. R. R., Minn.		
Escanaba, Mich.	100	7
Evansville, Wis.	40	3
Eyota, Minn.	75	5
Fall River, Wis.	40	3
Faribauld, Minn.	100	7
Farmington, Minn.	100	7
Fond du Lac, Minn.	150	10
Fond du Lac, Wis.	40	3
Forest Lake, Minn.	100	7
Fort Atkinson, Iowa.	100	7
Fort Atkinson, Wis.	30	2
Fort Ripley, Minn.	150	10
Fox Lake, Wis.	40	3
Giard, Iowa.	75	5
Granville, Wis.	25	2
Green Bay, Wis.	60	4
Greenfield, Wis.	75	5
Hamilton, Minn.	100	7
Hanover, Wis.	30	2
Hartford, Wis.	25	2
Hartland, Wis.	25	2
Hastings, Minn.	100	7
Hinckley, Minn.	125	8
Horicon, Wis.	40	3
Houghton, Mich.	150	10
Hudson, Wis.	100	7
Iron Ridge, Wis.	25	2
Janesville, Minn.	100	7
Janesville, Wis.	40	3
Jefferson, Wis.	40	3
Juda, Wis.	30	2
Juneau, Wis.	40	3
Kasson, Minn.	100	7
Kettle River, Minn.	125	8
Kilbourn City, Wis.	50	3
La Crosse, Wis.	75	5
Lake City, Minn.	100	7
Lake Crystal, Minn.	150	10
Lansing, Minn.	100	7
Lawler, Iowa.	100	7
L'Anse, Mich.	150	10
Leroy, Minn.	100	7
Le Sueur, Minn.	150	10
Lewiston, Minn.	75	5
Lime Springs, Iowa.	100	7
Litchfield, Minn.	150	10
Little Falls, Minn.	150	10
Little Suamico, Wis.	75	5
Lone Rock, Wis.	60	4
Long Lake, Minn.	125	8
Lowell, Wis.	40	3
Luana, Iowa.	75	5
Lyle, Minn.	100	7
Lyndon, Wis.	60	4
Madelia, Minn.	150	10
Madison, Wis.	40	3
Manitowoc, Wis.	50	3
Mankato, Minn.	150	10
Marquette, Mich.	150	10
Mason City, Iowa.	100	7
Manston, Wis.	60	4
Mazomanie, Wis.	50	3
McFarland, Wis.	30	2
McGregor, Iowa.	75	5
Medford, Minn.	100	7
Mendota, Minn.	100	7
Menomonee, Minn. / C. K. Marinette, Wis.	75	5
Middleton, Wis.	50	3
Milton, Wis.	30	2
Milton Junc., Wis.	30	2
Milwaukee, Wis.		
Mil. Stock Y'ds, Wis.	10	1
Minneapolis, Minn.	100	7
Minneiska, Minn.	100	7
Minn Junc., Wis.	40	3
Monona, Iowa.	75	5
Monroe, Wis.	40	3
Moose Lake, Minn.	150	10
Mud River, now Aiken, Minn.	150	10
Muscoda, Wis.	60	4
Nashotah, Wis.	25	2
Neenah, Wis.	50	3
Negaunee, Mich.	150	10
New Hampton, Iowa.	100	7
New Lisbon, Wis.	60	4
Norah Springs, Iowa.	100	7
North Branch, Minn.	100	7
Northfield, Minn.	100	7
N. P. R. R. Junc., Minn.	150	7
North Prairie, Wis.	25	2
Oconomowoc, Wis.	25	2
Oconto, Wis.	75	5
Omro, Wis.	50	3
Oregon, Wis.	30	2
Oshkosh, Wis.	50	3
Ossian, Iowa.	75	5
Otsego, Wis.	40	3
Ottawa, Minn.	150	10
Owatonna, Minn.	100	7
Ozaukee, Wis.	25	2
Orford, Wis.	30	2
Palmyra, Wis.	25	2
Pardeeville, formerly Midland, Wis.	50	3
Pensaukee, Wis.	75	5
Peshtigo, Wis.	75	5
Pewaukee, Wis.	25	2
Pine City, Minn.	150	10
Plymouth, Iowa.	100	7
Portage City, Wis.	50	3
Postville, Iowa.	75	5
Prairie du Chien, Wis.	75	5
Prescott, Wis.	100	7
Ramsey, Minn.	100	7
Randolph, Wis.	40	3
Redwing, Minn.	100	7
Reeds Lauding, Minn.	100	7
Ritchfield, Wis.	25	2
Ridgeway, Iowa.	100	7
Rio, Wis.	50	3
Ripon, Wis.	50	3
River Falls, Wis.	100	7
Rochester, Minn.	100	7
Rolling Prairie, Wis.	40	3
Rosemount, Minn.	100	7
Rubicon, Wis.	25	2
Rush City, Minn.	150	10
Rush Lake, Wis.	50	3
St. Anthony, Minn.	100	7
St. Charles, Minn.	75	5
St. Cloud, Minn.	150	10
St. James, Minn.	150	10
St. Paul, Minn.	100	7
St. Paul Junc., Minn.	100	7
St. Peter, Minn.	150	7
Sauk Rapids, Minn.	150	7
Schleisingerville, Wis.	25	2
Shakopee, Minn.	100	7
Sheboygan, Wis.	40	3
Sicottes, Minn.	150	10
Smith Lake, Minn.	125	8
Sparta, Wis.	75	5
Spring Green, Wis.	50	3
Stillwater, Minn.	100	7
Stoughton, Wis.	30	2
Sun Prairie, Wis.	40	3
Thompson, Minn.		
Tomah, Wis.	75	5
Trempeleau, Wis.	75	5
Two Rivers, Wis.	50	3
Wabasha, Minn.	100	7
Waseca, Minn.	125	8
Waterloo, Wis.	40	3
Watertown, Wis.	25	2
Waukau, Wis.	50	3
Waukesha, Wis.	25	2
Waupun, Wis.	40	3
Wauzeka, Wis.	60	4
Wayzata, Minn.	125	8
West Salem, Wis.	75	5
White Bear Lake, Minn.	100	7
Whitewater, Wis.	25	2
Willmar, Minn.	150	10
Winneconne, Wis.	50	3
Winona, Minn.	75	5
Woodland, Wis.	25	2
Wrightstown, Wis.	70	5
Wyocena, Wis.	50	3
Wyoming, Minn.	100	7
Baraboo, Wis.	50	3
Breckenridge, Minn.	150	10
Buffalo River, Minn.	200	13
Campbell, Minn.	150	10
Dassel, Minn.	125	8
Detroit Lake,	150	10
Ft. Garoy, B. N. A.	225	15
Frontenac, Minn.	100	7
Etter, Minn.	100	7
Garner, Iowa.	100	7
Grand Forks, D. T.	200	13
Hermann, Minn.	150	10
Heron Lake, Minn.	150	10
Hersey, Minn.	150	10
Iron Mountain, Wis.	25	2
Kellogg, Minn.	100	7
Fargo, Minn.	200	13
Leaf River, Minn.	150	10
Lodi, Wis.	50	3
L Ishpening, Mich.	150	10
Marinette, Wis.	75	5
Merrimac, Wis.	50	3
Minn City, Minn.	75	5
Morris, Minn.	150	10
Oak Lake, Minn.	200	13
Plymouth, Wis.	40	3
Pembina, D. S.	225	15
Reedsburg, Wis.	60	4
Rudd, Iowa.	100	7
Thiensville, Wis.	25	2
Saukville, Wis.	25	2
Sheyenne Crossing, D. T.	200	13
Waumakee, Wis.	50	3
Welwood, Minn.	150	10
Winona Junc., Wis.	75	5
Wonewoc, Wis.	60	4
Woodman, Wis.	65	4
Windom, Wis.	150	10
Worthington, Wis.	150	10

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 5. NEW YORK, FEBRUARY 1, 1872. WHOLE NO. 102.

EUROPEAN SALARIES.

The following are official statements of the salaries paid to the officers and employes of the telegraph service in several European countries. We have failed to obtain the rates of compensation in Great Britain in authentic form, and for that reason omit them altogether:

FRANCE.

General Superintendents	$2,400	per annum.
Division " 1st class	2,000	"
" " 2d "	1,800	"
Managers of offices, 1st class	560	"
" " 2d "	520	"
Principal Clerks	500	"
Operators, 1st class	480	"
" 2d "	420	"
" 3d "	360	"
" 4th "	320	"
" 5th "	280	"

SWITZERLAND,

Superintendent	$900	per annum
1st Secretary	600	"
2d "	500	"
Auditor	600	"
1st Assistant Auditor	480	"
2d " "	360	"
4 Inspectors	$540 to 720	"
Managers of Offices	360 to 600	"
Operators, 1st class	480	"
" 2d "	420	"
" 3d "	360	"
" 4th "	320	"

PORTUGAL.

Director-General	$1,500	per annum.
Inspector	1,100	"
Superintendents	500	"
Office Managers, 1st class	450	"
" " 2d "	360	"
Operators, 1st class	300	"
" 2d "	240	"
" 3d "	200	"
" 4th "	150	"
" 5th "	125	"
Line Repairers, 1st class	100	"
" 2d "	80	"

ITALY.

Chief Inspector	$1,200	per annum.
Sub-Inspector	800	"
Directors of 1st class	1,100	"
" 2d "	900	"
Chiefs of Section of 1st class	600	"
" " 2d "	560	"
Operators, 1st class	440	"
" 2d "	400	"
" 3d "	360	"
" 4th "	300	"
" 5th "	240	"

BAVARIA.

The average compensation per year is as follows:

For the assistants—First three years	$172	
" " After " "	189	
" " " six "	236	
" " " twelve years	268	
" Telegraphists—First three "	193	
" " After " "	286	
" " " six "	300	
" " " twelve "	364	
" Chief " First six "	386	
" " " After " "	429	
" " " " twelve "	472	
" " " " eighteen "	514	

TELEGRAPH BUYING.

[From the N. Y. Tribune.]

COMPETITION IN TELEGRAPHY.

The Gov't has a monopoly of Mail-carrying; the Western Union is exposed to competition in Telegraphing from every side. If you want to dip into *their* business, there is nothing in the way but an aching void, present or prospective, in your own pockets; if you interfere with the Govt.'s monopoly of letter-carrying, you do it at your peril. The Govt. pays nothing for the blunders or peculations of its mail-handlers; it may damage you $100,000 to-morrow through the loss or non-delivery of your letters, and it laughs at your petition for redress: the Western Union must pay for every blunder or error, no matter how innocent, so that the father of a girl at boarding school, who lately received a dispatch from the principal which read, "Your daughter had a child last night" (when it should have read *chill*,) made the Co. pay smartly for the operator's error. Just fancy that father applying to the Postmaster General for smart-money in such a case, and imagine the horse laugh which would be the only response.

When we shall have so reformed our Civil Service that every tide-waiter and letter-carrier shall not be expected to loose his place at each turn of the party wheel, and every third youth in the land shall not be looking to office as his way to subsistence and competence, we may think of enlarging the area of Govt. intermeddling with business.

THE EXAMPLE OF ENGLAND.

[From the Detroit Free Press.]

About the only thing adduced in its support is the statement that it would be a very good thing for the people to be able to send messages at a slight cost; and then we are told that the system works well in England, as if that made any material difference with us.

When we consider that the United Kingdom has altogether but 120,000 square miles—about equal to two States the size of Mich., with twenty-five times the population of our State—that the Postal Dept. of the Govt. there is selfsustaining, and that there is scarcely a quarter of the telegraphic business done in that country that there is here, and that most of the post-offices—and now also telegraph stations—there are in cities of comparatively large size, while here every village of a thousand inhabitants has a post-office, and would be entitled to a telegraph, it will be seen that there is

NO ANALOGY BETWEEN THE TWO COUNTRIES.

In England, too, there is not the same disposition to attack public men as there is in this country, and State secrets are much more closely guarded. The press, in the matter of news does not show anything like the enterprise of the American press, and the telegraph is not nearly as much used by them. In this country were there a postal telegraph line established, there would necessarily have to be private lines as well, for no one would feel safe in sending, through the hands of employes of the Govt. dispatches attacking their official superiors. Who supposes that, were all the wires under the control of the government, the N. Y. *Tribune*, and the press of the country at large, would have been able to publish the text of the Washington treaty at the time they did? But, unless the government had complete control of all lines, there would be little use of the scheme.

But in comparing Great Britain and the United States there is another point to be considered. There all appointments are non-partisan, officials not being indebted for their tenure of office to the will of an Executive, or of partisan majority in the legislature. Here all of the thousands of men given official positions by an arrangement such as that advocated by the P. M. Gen. would obtain their appointments more on account of their partisanship than for any other reason. Once appointed, it would be their constant aim and endeavor to keep in power the administration to which they were indebted for their places.

It should not receive consideration because it is a scheme which will only have the effect of

ADDING TO THE BURDENS OF THE NATION

without any adequate return. The present telegraph Co's lines would have to be purchased at an enormous cost, or new ones erected. The telegraph being under the direct supervision of the Govt., demands would come from the extension of the lines into almost every nook and corner of the country; and these demands would have to be acceded to. It is estimated that the first cost of buying the lines now existing and of erecting the new ones desired would approximate $70,000,000, while the Govt. would have to employ from 10,000 to 25,000 operators at a frightful annual aggregate of expense. Our P. O. at present does not pay expenses. Can it be expected that a postal telegraph would be anything like selfsustaining? The telegraph business at present pays, but lines are only extended where there is considerable occasion for their use, and the tariff of charges is so arranged as to make it profitable. A postal telegraph in our widely expanded and sparsely settled country would be a charge on the people of millions of dollars annually.

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RAILROAD WIRES; THEIR USES AND ABUSES.

An article, entitled "Railroad Wires; their Uses d Abuses," signed "Observer," in your issue of ec. 15th, has been read by me with interest. Will "Observer" kindly be a little more plain in his explanation of how to remedy what he calls "a very common abuse"—the repeating of train orders? I am open to conviction, and ready to adopt improvements, but I can't yet understand that the way proposed is an improvement. I have been a train dispatcher four years, and have examined several systems, but the only *safe* one I have seen is that in almost universal use of having a message repeated from the conductor and engineer of the train to whom it is addressed. Let us suppose two trains, approaching each other, are three or four stations apart, and it is necessary to hold the one having the right to track till the other arrives; by "Observer's" plan, the orders are sent to both trains at once; the one giving the train a right to go ahead is delivered *O K*, and the other, either through carelessness, neglect, or some other cause, is not; the consequence is a collision, and probable loss of life and property, all of which would have been prevented had the message been first given to the train having the right of track, and then, after receiving their reply saying they understand the order, the message given to the other train to go ahead. Is not a little crowding of wires, a little delay of business, a little vexation and worry far preferable, when combined with safety, to their absence, and a chance of accident? However, as I said before, I am open to conviction, and would be glad to find a remedy for what I must acknowledge to be unpleasant condition of things. Will "Observer" name some road where this "primitive usage" and "very common abuse" has "been abandoned long since," that I may open a correspondence with the train dispatcher, and improve myself in that branch of my business?

T. D.

ANOTHER ON THE SAME SUBJECT.

To the Editor of the Journal of the Telegraph.

Being a constant reader of the JOURNAL, we noticed in your last issue an article referring to railroad wires and their abuses, signed "Observer." Having had a little to do in connection with railroad wires, we are also acquainted with the general mode of sending train orders. Now, we are in favor of improvements, and would be very glad to hear of some method by which the labor and the time consumed in sending train orders might be lessened, but we are afraid "Observer's" plan would hardly "work" in all cases. In some cases it is true one order might be made to answer for two trains, but it is necessary, in order to insure safety, to receive the "32" message from the train which has the right of the road before the order is given to the other train.

Besides, in most cases, there are parts to be inserted in the order for one train that do not refer in the least to the other; therefore we cannot see but it would in most cases make the orders long and tedious enough to more than occupy the time used for two orders.

Yours truly,

ANOTHER "OBSERVER."

STILL ANOTHER.

BURE, January 2, 1872.

To the Editor Journal of the Telegraph:

SIR:—In No. 99 of the JOURNAL I notice an article by "Observer," in which he charges that the manner of sending train orders, as it is generally done, is one of the abuses of railroad wires. His remedy for the abuse, is to make "one order answer for the two trains, by calling up both offices and having them copy at same time." This is a brilliant idea, and reflects great credit upon "Observer." As he seems to know how it is himself, will he please explain how he succeeds in putting the two following orders into one, so that it will answer for both trains.

(1.) To "*Opr. A. Hold No. 1 for No. 2.*"

(2.) To "*Condr. and Engineer, No. 2, B. Run to A, regardless of No. 1.*"

I hope "Observer" will give full details of the system of train dispatching used on the roads that have abandoned, the primitive custom of "first giving an order to one train and then sending another order to the other train." Verdantly yours,

GREEN FLAG.

ACTION OF MAGNETISM ON GAS.

De La Rive and Sarasin have recently laid before a scientific society of Geneva, Switzerland, an important communication, in which they arrived at the following conclusions:—1. The action of magnetism, when only exercised upon a part of an electric jet, projected through a rarified gas, causes an increase of density. 2. The same action on an electric jet placed equatorially between the poles of an electro-magnet produces in a rarefied gas an increase of resistance, which is greater in proportion to the conductivity of the gas. 3. The same action creates a decrease of resistance, when the jet is directed in the line of the axis between the magnetic poles. 4. When the magnetic action consists in the impression of a continued movement of rotation of the electric jet, this action has no influence upon the resistance, if the rotation is in a plane perpendicular to the axis of the cylinder of magnetized iron which determines the rotation; whereas, the resistance decreases considerably if the rotation takes place so that the electric jet describes a cylinder of revolution about the axis. 5. These several effects cannot be attributed to a variation of density produced by the action of magnetism on the gas, but probaby they are explained by the perturbation that such action causes in the molecular arrangement and disposition of the particles of the rarefied gas necessary for the propagation of electricity.

MANY years ago, Professor Edmund Davy, of Dublin, devised 'a simple electro-chemical method of ascertaining the presence of different metals; applied to detect minute quantities of metallic poisons,' which is well worth recalling to notice. He employed a voltaic arrangement of small slips of zinc and platina, placed in contact, and forming a galvanic circuit with the interposed fluid suspected to contain the poisonous metal. In the action thereby set up, the poison was deposited in the form of crystals on the negative surface of the slips of metal; arsenic could be detected if only the five hundredth part of a grain were deposited; and Professor Davy has recorded that in some instances he could appreciate the two thousand five hundredth part of a grain by the application of appropriate tests.

Another advantage of this method is, that these minute quantities can be detected even when mixed with ordinary articles of diet, such as wheaten flour, bread, starch, rice, potatoes, sugar, vinegar, eggs, gelatine, gruel, various kinds of wine; and also in the saliva and bile Besides arsenic, Professor Davy experimented with corrosive sublimate, acetate of lead, and sulphate of copper, and always with the same satisfactory result. In some instances where the common tests failed to act, or only acted fallaciously, he found the electro-chemical method act with the greatest certainty,

THE POWER OF LIGHTNING.

The concentration of power in a stroke of lightning, acting through an inconceivable small interval of time, may perhaps be realized after examining its work of destruction, yet its inductive action on the earth's surface is not less wonderful. Prof. A. M. Mayer made an experiment, some time since, which demonstrated the extent of this action. He connected the wire of a galvanometer with the water-pipes of Baltimore, Md., and joined the other end of the coil to a gas-pipe of a house in the south-western part of the city. Thus a vast metallic system of electric nerves stretched three miles towards the north-west, to the reservoir, and about as many miles to the east and south-east, over the city. A thunder-storm was raging at the time in the north, at so great a distance that only the illumination of the clouds told when a flash occurred. Yet whenever that flash took place, the needle of the galvanometer was instantly deflected through ten or twenty degrees. So nearly simultaneous were the two occurrences that no difference in the instant of their manifestation could be detected. Shutting himself up in a dark room containing the galvanometer, he signalled, when the needle moved, to an observer of the storm, who also gave a signal whenever a flash occurred; and the exchange of signals was always found to be simultaneous. It was ascertained on the following day that the storm was more than twelve miles distant, thus showing that over 500 square miles of earth's surface was effected at each flash of the ligtning.

THERE is nothing that more distinctly marks the progress of the age than the rapidity with which the electric telegraph lines are being carried through the indolent States of the South American continent, thus extirpating the antiquated ideas implanted years ago by the Spanish and Portuguese adventurers, and which for centuries have been so zealously sustained under the powerful protection of the followers of Loyola. In no portion of the Southern continent is this distinctive feature of modern progress more notable than in the Empire of Brazil, whose liberal-minded sovereign has ever been a firm friend of progress. Brazil has as yet, however, but nine hundred and fifty American miles of telegraphic wire, exclusive of the wires of the different railways; but there are many lines being erected, one of which, 1,060 miles in length, will shortly unite Rio de Janeiro with Pernambuco. Still there is a field for telegraphic enterprise yet open in the dominions of Don Pedro, and extensive contracts are daily made with large European and American capitalists. The territory is so vast that, so far, Brazil has only been able to construct one league of telegraph line for each square of one thousand leagues of territory. But Brazil is far outstripping her sister States, and before very long all her principal cities will be in telegraphic communication. It is the boast of the Emperor of Brazil that his reign shall see his country rival the great Republic of the North.—*N. Y. Times.*

PEOPLE who are willing to sleep shut up like a jack knife will be delighted to know of a new process of insuring longevity. A California scientist, whose head like his back must be a trifle weak, declares that he has prolonged his life by sleeping with his finger tips touching his toes, and has invented a machine to hold the body in that graceful and pleasant position. He contends that the "vital electric currents are thus kept in even circumflow, instead of being thrown off at the extremities and wasted." There is no patent upon the great discovery, and any one with a sufficiently supple back, is, of course, free to try the experiment.

CONCERNING the late storm on the Kansas Pacific, a Kansas paper says that the telegraph poles were blown across the track for miles, the wires becoming entangled with the engine and wheels of the train, and the engineer and fireman driven from their posts. Whole herds of buffalo crowded around the cars seeking shelter from the storm.

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A COMPENSATING COMPASS.

M. Arson, engineer to the Parisian Gas Company, has just invented a compensating apparatus for correcting the deviation of the Compass. The needle of course does not in general indicate the position of the magnetic north. It is affected by the masses of iron entering into the construction, the armament, or the cargo of the ship. These deviations, which were very feeble in the time of wooden sailing vessels, have become more and more considerable in proportion as iron has been more largely used in the hulls of ships, as powerful engines and boilers have been introduced, as armor plates of ever-increasing thickness have been added to the sides of vessels, and as iron has been utilized for masts and rigging. There are cases were the magnetic influence of the ship so overbalances that of the earth, that although the position of the compass is chosen with the greatest care, it is impossible to obtain much information from its indications.

The means most generally employed to escape this inconvenience consist in checking the deviation of the needle by the influence of the ship, and preparing either tables of corrections or a curve, called Napier's curve, the inspection of which allows the deduction of the true from the observed variations. This estimation of deviation entails a rather long and delicate operation, which, moreover, has to be repeated for different latitudes, to allow for the alterations of magnetic influence.

The mathematical works of Poisson and of Airy have furnished, it is true, analyses of complicated magnetic phenomena, and many investigators have proposed means of compensating the deviating influences. But navigators have shown in general little confidence in these various systems, because all would require frequent changes in the position of the magnets, or of the masses of iron which serve for compensation; and these changes involve operations so delicate, and an incertitude so great, that it is preferred to put confidence in a compass which is supposed to be compensated, and which is more or less true.

The masses of iron in a ship act in two manners on the needle of the compass—first by their permanent magnetism, and then by the induced magnetism that they take under the influence of the earth. The first effect is constant, and comparatively easy to subdue. The second varies with the position of the ship, and can be compensated only by a movable needle.

The uncertainty of the moving compensators involves, in the port of departure, the correction of the deviation of the compass by a magnet, as far as possible, then ascertaining by direct observation the remaining deviations, in order to place their quantity on the table or on the curves of correction. At present this is the general practice in the navy.

M. Arson hopes by this arrangement to obtain exact compensation. Fixed magnets compensate the deviations due to the permanent magnetism. Bundles of soft iron wire placed according to certain laws given by calculations, ought to compensate the deviations caused by induced magnetism in all positions of the ship and in all latitudes. The proposed apparatus, which has already been applied on one of the steamers of the Transatlantic Company, contains, besides the ordinary card, a second card, serving as an indicator. When it is wished to follow a given route, this latter card is traced by means of a wheel until it indicates the desired angle. Now, by this movement the operator has placed the packets of soft iron into the position in which they are required to compensate for the deviation corresponding to the position of the ship. It is sufficient then to adjust the needle of the compass to the same angle which has been given, in order that the route indicated may be actually followed.

Conversely, if it be wished to ascertain at any moment the route which the ship follows, it can be done by moving the wheel before-mentioned until the repeating circle indicates the same angle as the compass. By this movement the compensating parts will have been placed in the position which corresponds to the compensation in he azimuth where the vessel is; the angle observed will be the true angle of the route.—*English Paper.*

THE ACTION OF DILUTE SULPHURIC ACID ON AMALGAMATED ZINC.

It is commonly supposed that the action of dilute sulphuric acid on the amalgamated zinc used for the negative metal in a galvanic battery entirely ceases when the battery is not in action. This, however, is not the case, as a slow decomposition continually goes on, and it will be found that in a day or two the surface of the zinc will become covered with a thick layer of a spongy amalgam of the mercury and zinc, which increases day by day, and, if the battery be a Daniell, will soon attach itself to the porous diaphragm, and, decomposing the cupric sulphate, soon cause the battery to cease working. When, however, it is only required to use the battery for a few hours, the amalgamation of the zinc is very beneficial, as it preserves the surface of the zinc bright, but it does not increase the electro-motive force, as is sometimes supposed.

M. Th. Du Moncel, in the *Comptes Rendus*, t. lxiii. p. 436, in an elaborate memoir, shows that, by increasing the size of the electro-positive plate of the voltaic battery, the intensity of the current is not affected if the resistance be great; but in a circuit of small resistance the resistance of the battery cannot be neglected. When the size of the electro-negative plate is increased, the permanency of the battery is decidedly greater; there is also greater economy of zinc, and the intensity, contrary to his expectation, in no way diminished.

PHYSIOLOGICAL EFFECTS OF LIGHTNING.

The New York *Medical Journal* has an interesting paper on the physiological effects of lightning, from which we gather the following statement:

"A thunder-bolt has been seen," says Barbaret, "to split a tree without even blackening it, while it *reduced to ashes* a shepherd who had taken refuge under its branches." . . . "One man alone was killed," says Abbé Richard, "and *almost reduced to dust*, in the midst of many others who were under the same tree." . . . "The most curious as well as the most recent instance is the following: At Vic-sur-Aisne, in 1838, a thunder-bolt struck a lime-tree, under which three soldiers had taken shelter; they were all killed at the same instant; still, although lifeless, the three *remained erect*, as if the electric fluid had not reached them, their clothing also appearing uninjured. But when they were touched, all fell, so it is said, into a *heap of ashes*."

Colonne says: "The fire of exhaltation which forms the thunder-bolt must be so subtle and penetrating, that it kills a man by drying up instantaneously all his humors, without in the least changing his figure. We do not perceive him dead until we *touch* him, and then *we see him fall to dust*."..... Gronberg remarks: "It is demonstrated that lightning reduces bones to *ashes*, but never to the state of fusion." Izarn observes: "It is proved that lightning reduces bones to ashes." In fine, Abbé Mann asserts: "Lightning reduces to ashes all parts of the human body, without altering the clothes or skin."

Besides the complete incineration of persons, or of portions of bone, and of trees struck by lightning, we have also found that of some inorganic bodies, such as the following: a lady's *bonnet*, a man's *shoe*, except the wooden sole; *panes of glass* in windows; a *cloth* covering shields which were fused; a *purse*, the gold and silver which it contained not being damaged; the *scabbard* of a sword; a large *beam* reduced to dust in the middle of a chamber closed and fastened on all sides, without any injury to the chamber; the different *materials* of a house destroyed by lightning; the wood of a *cask*, etc.

General Comte de Maistre, son of the illustrious author of *Soirees de Saint-Pétersburg*, informs Dr. Boudin that some Sardinian sailors killed by lightning in the Mediterranean presented all the signs of death by *freezing*. "This observation is the more remarkable," adds M. Boudin, "as it recalls the congelation of wine long ago noticed by the ancients." On a man struck by lightning toward the back of the head, at the passage of the stroke, there could be found neither fracture or fissure, nor yet an alteration in any other part of the skull. The brain was also very sound, there being alone at the superior part *congealed lymph*, which had infiltrated in the folds of the *pia mater*. This young man, killed by the stroke remained *immobile*.

The following theory is proposed as an explanation of this curious fact:

The recent researches of MM. Joule, Clausius, Thomson, and others, have led physicists to regard heat as resulting from a rotary motion of particles about a axis, and M. de la Rive has considered this hypothesis as calculated to explain the polarity of atoms. This *savant* then asks, "if it might not be possible that the cause of the heat generated by the reunion of the two electricities, brought about under the form of discharge of current, may be, not in the fact itself of this reunion, but in an increase of molecular motion, which might result from the transmission of electricity?" Consequently, according to this theory, a current or an electrical discharge directed upon a body, must give rise to two molecular motions in contrary directions, and in the sequel to effects equally inverse. In the first case, the current being directed *in the same way* as the polarity which produces the natural heat of the body, it is evident that it augments the rotary motion of the particles around their axes, raises their temperature, and produces in proportion to its energy new thermo-mechanical effects. The result, therefore, will be the elevation of the temperature of the body traversed by the current of electrical discharge. In the second case, the current being, on the contrary, *in an inverse direction* from the polarity which produces the natural heat of the body, it is also evident that it diminishes the rotary motion of the particles around their axes, lowers the temperature, and produces, as in the first case, thermo-mechanical effects proportional to its power. The result will therefore be a lowering instead of an elevation of the temperature, which lowering may descend to the freezing-point.

The London *Illustrated Times* says: "By the way, speaking of water-proofs, I think I can give travelers a valuable hint or two. For many years I have worn India-rubber water-proofs, but I will do so no more; for I have learned that good Scotch tweed can be rendered utterly impervious to rain, and moreover, I have learned how to make it so, and for the benefit of my readers, I will give the receipt: In a bucket of water put a half pound of powdered alum; then stir this at intervals until it becomes clear; then pour it off into another bucket and put the garment therein, and let it remain for twenty-four hours, and then hang it out to dry without wringing it. Two of my party, a lady and a gentleman, have worn garments thus treated, in the wildest storms of wind and rain without getting wet. The rain hangs upon the cloth in globules. In short, they were really water-proof. The gentleman, a fortnight ago, walked nine miles in a storm of wind and rain, such as you rarely see in the south; and when he slipped off his overcoat his under clothes were as dry as when he put them on. This is, I think, a secret worth knowing, for if cloth can be made to keep out wet, it is in every way better than what we know as water-proofs.

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THE FRANKLIN STATUE.

The erection of the statue of Benjamin Franklin in Franklin Square, New York, and its inauguration on the anniversary of his birth-day, January 17th, is so identified with the erection of the Morse statue in June last that we deem it proper that a record of it be preserved. Independent, indeed, of any such connection, there must ever be associated in the minds of men throughout all time a relationship between Benjamin Franklin and the lightning, which properly identifies his name with the telegraph, "the last best gift of science to the world." The statue itself is of colossal size, and is the gift to New York of Mr. Albert DeGroot.

The ceremonies commenced at noon, and after prayer by Rev. Dr. Deems, Douglas Taylor, Chairman of the Committee of Arrangements, introduced Prof. Morse, saying: "This distinguished inventor and pride of our country will now unvail the statue of Franklin."

PROF. MORSE'S REMARKS.

Mr. De Groot and Fellow-Citizens: I esteem it one of my highest honors that I should have been designated to perform the office of unvailing this day the fine statue of our illustrious and immortal Franklin. When requested to accept this duty I was confined to my bed; but I could not refuse, and I said yes, if I had to be lifted to the spot. Franklin needs no eulogy from me. No one has more reason to venerate his name than myself. May his illustrious example of devotion to the interest of universal humanity be the seed of further fruit for the good of the world.

At the close of his remarks, Prof. Morse removed the streamer by which the folds of the flag covering the statue were kept in position, and the massive figure suddenly appeared to view, amid the loud cheering of the crowd, music by the band, and a salute from a cannon in the Park. Prof. Morse then retired to the *Tribune* office, being greeted on his departure with hearty cheers.

Hon. Horace Greeley was then introduced, and presented the statue to New York.

MR. GREELEY'S ADDRESS.

I rejoice that this work is, like its subject, purely American. It may be that European art is able at this stage to have produced a better one—though I think not. [Laughter.] But, at all events, the production of this is our warrant for believing that if better statues can be created, we have by this example—by this achievement—prepared our countrymen to produce them in a future not distant. [Applause.] I rejoice, fellow-citizens, that, while presenting an American statue of an American philosopher, the gift of a public-spirited American citizen, we have been assisted to-day in inaugurating this statue by that eminent American discoverer, who to-day is the nearest resemblance to the great and patriotic citizen whose memory we all honor. I rejoice that Prof. Morse—born in that very city of Boston, within rifle-shot of Franklin's birth-place, and the year after Franklin died, and who seems to have been raised up by Providence to be the continuer of that great work of which Franklin was the beginner—I rejoice that he has been spared to meet with us on this interesting occasion. This man seems to me to be the proper successor of Franklin; the one taught the world how to tame the lightning, and the other has taught us how to render it most useful as a messenger of intelligence across continents and oceans; so that to-day, by the invention of Morse, the whole world is placed in instantaneous communication, and any interesting event is flashed as by the lightning from one end of the habitable globe to the other. So I may say, fellow-citizens, in honor of Franklin, and I may also say in honor of Morse, I present, in behalf of Capt. De Groot, this statue of our great exemplar to our intelligent and, I trust, appreciative profession.

After another air by the band, the following address of acceptance was made by C. C. Savage, President of the Board of Trustees of the New York Typographical Society:

ADDRESS BY MR. SAVAGE.

Albert De Groot and Gentlemen of the Press: It is appropriate that this statue should be erected in this centre of our trade, in the very midst of our craft work, instead of in Central Park; for Franklin's life was devoted to practical hard work, rather than to the ornamental and the recreative. Could Franklin step into the mammoth printing and newspaper offices which surround this monument—could he look into yonder Post Office—what thoughts and contrasts would they suggest? I would remind you of Franklin's habits of industry and frugality whereby he early acquired ease in business and wealth; of his unswerving integrity, which secured him the steadfast confidence of his countrymen; of his fidelity and patriotism, which brought him the highest honors and offices in the gift of his country; of his sagacity and justice, which enabled him to cope with and master the most astute statesmen of Europe; of his studiousness and research, which gave him the key to unlock the Divine Arcana, and present to the world priceless treasures; and of his temperance, which preserved a sound mind in a healthy body for more than four-score years. In a word, Franklin was ever diligent in whatever department he labored, to leave it better than he found it; and he stamped the whole with the simplicity, genius and grandeur of his unaffected manhood. Surely, such a man is a co-worker with the Deity, to uplift humanity, and bring the race nearer to freedom, to brotherhood, and to God.

Prof. Morse, we welcome your participation in this scene; for no hand was deemed so worthy to lift the vail as yours. Franklin caught the electric thought from heaven; but it was reserved for you to yoke its untamed power to the service of industry and intelligence. Wherever the iron nerves traverse the earth, there will be known and linked the names of Franklin and Morse.

Albert De Groot, we thankfully receive this deed of trust from your hands, and we pledge ourselves and our successors to guard it with the vigilance of love. May God bless you for your noble gift!

THE BANQUET.

A grand banquet was given in the evening, which was attended by a number of distinguished gentlemen, in the list of whom we notice the President of the Western Union Telegraph Company.

A number of spirited speeches were made, chief among which were those of Dr. Prime, Rev. Henry Ward Beecher, and Mayor Hall. We have only space for that of the latter gentleman.

MAYOR HALL'S SPEECH.

I take the reception you have given me as a proof that you will not discharge an old compositor because his types get mixed [laughter], or because he slipped while the devil was running away with his copy. To-day the city which you have toasted beheld Franklin's statue unvailed. Last summer she witnessed the dedication of another to Morse. The first one faces the newspaper temples wherein public opinion finds shrines. The other confronts newspaper readers who daily throng Central Park; from the skating newsboy to the sauntering student. But why these statues in this antithetical attitude? Is it not that the distance between the down-town statue and the up-town one—at topographical points that also mark the material growth of the city from the era at which Franklin died to the epoch in which Morse still honorably survives—that this distance may represent the intervening and crowded space in history between the first and freest ally of newspaper enterprise; or between the hand printing press and the electric telegraph—between the lightning experiments of Franklin and the electric utilizations of Morse? The presence of these two statues in this crowded metropolis will ever emphasize an old text, and indeed paraphrase it—He who runneth may read, thrilling references to the march of human intelligence.

The spectacle this day witnessed in Printing House Square will become historical in the annals of the State and city—Morse unvailing the statue of Franklin! It was as if Herschel had dedicated a monument to Copernicus, or Robert Hoe one to Caxton, or Faraday another to Roger Bacon, or Mr. Beecher one to St. Paul.

THE CALLAUD BATTERY.

A record of 80 cups Callaud local battery for the month of December, 1871, shows the consumption of sulphate of copper to have been 16½ ounces per cup for the month, the circuits being in use in the day time and about half of the night.

A record of 200 cups of Callaud local, for the month of November previous, shows an average consumption of 22½ ounces per cup for the month. The largest amount consumed by a single cell within one month, of which we have a record, is 28 ounces, the circuit been closed night and day on a local sounder, with a resistance of 2 ohms. The average resistance of the cell 2¾ ohms.

A record of 36 cells main battery on a line five miles long with three instruments shows a consumption of sulphate of copper of 5$\frac{3}{16}$ ounces for the month of December. The circuit was closed during the day and generally during the night.

A record of 15 cells battery on a line one mile long with two instruments show a consumption of 6 ounces per month, per cell.

The average resistence, 63 cups Callaud main battery, was 4 ohms. That of the same number of Daniell main cups was 3½ ohms.

The consumption of zinc was in proportion to that of vitriol, the average being about 4 ounces per cup, per month.

The above maximum of consumption shows this battery to be as cheap in maintenance as any in the material consumed for the work done.

Add to this consideration the fact that the Calland battery maintains its constancy for a much longer period than any other, and that the labor of maintenance is almost nothing, and we see the reason why it is being so commonly adopted in this country as well as Europe.

INTERPRETING THE RULES.

There seems no apology for the construction of the rules indicated by the following message from W. Albany, N. Y., to Buffalo.

To ——

Buy as soon as you can, and ship if you find kind I want. 14. paid. Signed ——

Answer if you buy.

The postcript was sent, as will be seen, free. It is difficult to tell why. No rule warrants it. It should have been inserted in the body of the message and charged 18 words.

THE TELEGRAPH CONGRESS.

THE COLISEUM ILLUMINATED.

Telegram to the New York Herald.

ROME, Jan. 15, 1872.

The convention adopted by the International Telegraph Congress has been signed and the delegates have gone home.

CIVIC HONOR TO THE REPRESENTATIVES OF PROGRESS.

The illumination of the Coliseum in honor of the Telegraphic Congress was most successful. An enormous crowd of people were present to witness the spectacle, which was most magnificent. At a given signal the whole of the majestic ruins were bathed in a sea of light, the spectators remaining to the last. Before the crowd had time to disperse finally three rockets fired in the air announced another phase of the spectacle, and instantly the whole of the edifice was again illuminated, but this time each row of the extensive galleries displayed a different color. The persons who had assembled to witness the display then dispersed, highly gratified by the spectacle.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY.

APPOINTMENTS EASTERN DIVISION TO DECEMBER 1, 1871.

Compiled by Edward C. Cockey, Esq., Gen'l Supt's Office, N. Y.

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E. Cadmus	"	Main Office, Boston.
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Robt. I. Wynne	"	Philadelphia, Pa.
Jas. F. Marshall	"	Philadelphia, Pa.
R. C. Cake	"	Rahway, N. J.
Joel James	"	Trenton, N. J.
W. E. King	"	Womelsdorf, Pa.
Lewis Klotz	"	Washington, D. C.

*Dead.

AN ANXIOUS MAN.

TOLEDO, Ohio, Jan. 1st, 1872.

DEAR SIR :—I have heard much in regard to the Automatic Telegraph Company of New York.

Now I am practicing telegraphing at the W. U. Telegraphing Office in this place and am about half through with the course. I have paid half the tuition, the remainder is due soon, but if this Automatic Company can do all they claim I will give it up before I pay the remainder, as many operators will in time be thrown out of employment and, of course, there will be no chance for new or inexperienced operators as this system must become obsolete.

This new company claim they can send from 500 to 1500 words per minute, and at a cost of not more than 25 cents per fifty words from New York to Chicago, or can when under good head-way.

Now, you must know something about this company, whether they can do what they claim or whether there is some draw back that will prevent its going into universal use. Will you give me your opinion as to whether it would be best for me to complete my course, and do you think there are still chances for good operators, by the Morse system, in the West. A STUDENT.

Answer.—Better finish your course. Automatics are as yet in a very infantile condition. The Morse system shows no signs of any early death.

MIDDLETOWN, Jan. 9th, 1872.

To the Editor of the Journal of the Telegraph:

As in our business there are many operators that seem to circulate, and the principal portion of the manipulating force are young men, it would be an advantage to all to have a protecting society under the auspices of the W. U. Company, having examiners as the public schools have, in some places, who will give the persons passing examination a graded certificate of ability. As each operator would want a certificate, an income sufficient to pay expenses could be easily obtained. Cannot some one originate the society in fact, as it has long been originated in theory. It could be much easier carried on in our occupation than almost any other.

OPERATOR.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

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Address—

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Executive Rooms, Western Union Tel. Co.,
145 Broadway, New York.

NEW YORK, FEBRUARY 1, 1872.

TELEGRAPHIC MONEY ORDERS.

For the last twenty years, indeed, ever since the Telegraph offices were first opened to the public, there has been an instinctive perception of the use of the Telegraph in the quick provision of money at distant points, to meet special emergencies. A stranger in a city finds himself without means; a word to a friend or partner in a neighboring or distant city, would secure a speedy remittance. Cases more urgent where suffering needed instant relief induced an appeal for advances on the deposit of distant parties. Sometimes a merchant would beg the Company to accept money and retire paper due elsewhere, which the mails could not reach in season. To all these, as far as possible, but thus far to a very limited extent, the Telegraph Companies have endeavored to make the Telegraph available. The opportunity for fraud has been the chief obstacle in the way of meeting these constantly recurring emergencies.

We need not say that demands of the character indicated have increased, both in number and urgency. They have come to make a provision for their relief imperative. This had often previously been attempted by outside parties, but without satisfaction. The Telegraph Company alone could do it safely to itself and promptly to applicants. It could also do the work more economically, and with a complete knowledge of the circumstances. Yet a score of years have elapsed before Companies have felt convinced of the practicability of establishing a system of money transfers which would relieve a wide spread public want as this has proved itself to be with entire safety.

Having now become satisfied, after careful deliberation, of their duty in the matter, the Western Union Telegraph Company have organized a "Money Order Transfer Department," under which it is arranged that at almost any city or town of any prominence in the United States, an amount not exceeding *one hundred* dollars can be deposited for instant payment to parties elsewhere. About five hundred of these points have been designated, and numerous applications are already being made for transfers of small sums, to meet all conceivable cases, many of them relieving actual distress. At fifteen large cities, the limit of transfer is increased to $6,000, to meet the occasional exigencies of business men. Thus a deposit of $6,000 can be made in San Francisco, and a note in Boston relieved the same morning.

The chief difficulty in the way of the inauguration of the Transfer system has been the apparent danger of the trust. Allowing the utmost for the integrity of all parties, the peril of the trust must be evident. We believe, however, that this difficulty has been successfully met, and that the following arrangements have made the Money Transfer system possible and satisfactory.

1. Every order to pay out money has to be done through the District Superintendent or Agent of a District, of which there are about twenty in all. Offices acting thus under the eye of an executive officer of the Company, are protected from fraudulent orders. When the notice of a deposit is given in the appointed cypher to the Agent of a District, he gives personal directions in another cypher, for its payment where required. Fraud therefore seems possible only by connivance with the Agent of the District.

2. The cyphers used in this correspondence have been arranged with great simplicity and adaption. Thus, a page of 100 or more ordinary words arranged in columns is first given. Against these, figures, corresponding to the number of words, but in disorder, are placed. Thus the twentieth word may have No. 1 at its side, and the first, No. 45. This is the detective or initial page, from which a word must be taken to commence a transfer message, and *in the order of the figures*, irrespective of the words. On the first message sent by a transfer office, therefore, the initial word would be that word against which was found placed the figure 1. On the second transfer the message initial word would be that against figure 2. Thus with the figures variously arranged, and with the initial always changing for each office, and the duplicate only in the hands of the Superintendent, the protection is evident and easy.

3. A second page of the same class of words as on the first page, denote the amount deposited. These are not subject to change. It is evidently important that no confusion be allowed in stating amounts.

4. As an additional precaution, the "initial" or "detective" cypher is ordered to be used by some offices as the first, others as the second, others the third, and others still the last word in the message. Inasmuch, therefore, as the same class of words are used for the "initial" and the "amount," it is virtually impossible for one, not in possession of the cypher, to tell which is the one or which is the other.

Here then the American Telegraphs enter a new and important sphere. It seems the initial of an era when a wide spread system of exchanges by telegraph may prevail. It is a field which invites study, and challenges the most sleepless discretion. Both of these we are persuaded will be given. At present, the transfer money service is forced upon the Company by a decent regard to public wants, and has already given much satisfaction.

We had a practical experience of the value of this system, which we give without charge. A gentleman of a somewhat chronic neediness, resident 500 miles further west, came to us one morning as we sat down to our appointed duties. We saw money in his eye, and prepared to say "No" as bravely as we could. So he commenced: "I am in a fix, (we knew it) and want to go home on to-night's train, (these fellows are always going home) but I have no money, but can get plenty as soon as I get home," Happily then we thought of the Money Transfer system. "My dear fellow," we exclaimed, as we smiled into his discomfitted eye, "You can have all the money you want, by sending a message to your mamma, directing her to deposit to your credit, and getting it at the front office." Our friend didn't see it, and left. We saved at least, ten dollars by his going.

It seems necessary to explain the terms and working of the Telegraphers' Insurance Association, as many desire to join and need explanation.

1. Applicants must be in the business, and of good health and habits. These three things must be endorsed by some superintendent or manager known to the executive. Forms will be sent when requested.

2. The fee on entering is $1.50 and a postage stamp for the return of the certificate. One dollar of this goes to the heirs of the first member who dies after an applicant is admitted, and the applicant so admitted is subject to an assessment of one dollar whenever that first death occurs, and one dollar at each subsequent death, each assessment being for the heirs of the next succeeding member who dies. The entire amount of an assessment goes to the heirs of the deceased.

3. Thirty days are allowed for the payment of an assessment. If any one dies and owes an assessment more than thirty days, the insurance is forfeited.

4. Members who have forfeited their membership can be restored by an application, blanks for which will be furnished, and by the payment of back dues.

5. Members are expected to keep the Secretary informed of their address, and notices of assessment are sent by mail to each person.

6. As an aid to members in keeping informed with respect to assessments and the association generally, the JOURNAL OF THE TELEGRAPH will be supplied to actual members at fifty cents per annum.

We give on another page a list of defaulters which seems discouraging, yet is what might have been expected. We believe the membership will hereafter acquire greater coherence and solidity. Some excellent men have allowed their names to drop out of the brotherhood by inattention. We regret this. We believe the organization has amply defended itself by its work and that it is destined for great good. Were it not so, we would decline the constant toil it brings us, and for which we ask only the knowledge of the benefit it confers. The addition of seventy-five members during the first three weeks of January, gives token of a better future and a largely widened sphere of usefulness.

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THE POSTAL TELEGRAPH BILL.

The following is an abstract of the bill to connect the Telegraph with the postal service, recommended by the Senate Committee on Post-Offices:

SECTION 1 establishes postal telegraph offices at all Post-Offices on all telegraph lines, and at all other Post-Offices where the gross receipts for postage are $500 a year, if within ten miles of the telegraph lines. SEC. 2 fixes the rates uniform for equal distances, 25 cents between offices not over 250 miles apart; 50 cents between offices over 250 miles apart, and under 500; 25 cents for each additional 500 miles. Night rates, 25 cents for 1,000 miles. Rates to be refunded for delays or mistakes in transmission. SEC 3 provides for prepayment by stamps, and for the destruction of all telegrams within one month. SEC 4 fixes press rates for each one hundred words of special dispatches at 50 cents by night, 75 cents by day. It also fixes rates for press associations, and for private wires for newspapers. SEC. 6 defines the duties of the Fourth Assistant Postmaster General over the telegraph lines. SEC. 7 authorizes the Postmaster-General to contract for the transmission of telegrams at above rates, with parties who will furnish and operate the necessary lines of telegraph. SEC. 8 contains provisions against tampering with telegrams, and makes telegrams privileged communications as private letters. SEC. 9 authorizes the Postmaster-General to reduce the rates in the manner therein prescribed. SEC. 10 incorporates the Postal Telegraph Company for the performance of the postal telegraph service on behalf of the Postmaster-General. SECS. 11 and 12 authorize the Company to buy existing lines, and obliges it to purchase all such lines, if required by the owners thereof, at an appointed value. It fixes the capital stock at an amount not exceeding the last cost of its lines. SEC. 13 authorizes the Company to open offices wherever the wants of business may require. SEC. 14 authorizes Congress to purchase the lines at any time, at an appraised value. SEC. 15 reserves to Congress the right to alter or amend the act.

The proposal as will be seen above, is to establish a Telegraph Company which shall

1. Be a monopoly pure and perfect.

2. By agreeing to certain rates of charge, the business of the entire Continent shall be assigned to it without recourse for damages, the evidences of transmission to be obliterated by the destruction of all original messages within thirty days.

3. Confers the right on all existing lines to demand purchase by the Company so organized at specified rates, or rather, perhaps, compels all other lines to sell out.

4. Authorizes Congress to purchase the whole Telegraph property of the country at any time.

We shall watch the discussion of this report when brought up in the Senate for action, with interest. It seems like a scheme to secure a government telegraph control under the name of a private corporation, clothed with extraordinary powers and protection. To the public it ostensibly gives cheapness without responsibility; by the destruction of correspondence it obliterates the evidence of contracts; and renders impossible the gathering, after thirty days, of the traces of crime.

POPE'S Modern Practice of the Telegraph should be in the hands of every operator. Mailed promptly on receipt of price two dollars.

A LITTLE five-year-old boy was being instructed in morals by his grandmother. The old lady told him that all such terms as "by golly," "by jingo," "by thunder," etc., were only little better than other profanities. In fact, she said, he could tell a profane oath by the prefix "by." All such were oaths. "Well then, grandmother," said the little hopeful, "is 'by telegraph,' which I see in the newspapers, swearing?" "No," said the old lady, "that's only lying.'

THE BRITISH TELEGRAPH ADMINISTRATION.

HOW THE THING WORKS.

The telegraph operators who "struck" for higher wages lately have gone back to work, and submitted to the old system, and a snub besides. The cause of the strike may be gleaned from the following story, told by the *Cork Constitution*:—"A telegraph clerk was needed in the County Cork. A postmaster's daughter applied for the situation, and clearly evinced her superiority by thoroughly learning in a few days what often costs months of the closest application. She received a written appointment, fixing her stipend at six shillings per week, for which she was required to be constantly present in her office from morning until night. Under this arrangement she continued three months. But the other day the authorities resolved to give the economic screw a twist. So she received a communication to the effect that in future her salary would be reduced to £7 10s. per annum, or one penny per message. These terms she refused to accept, and so matters remained for some time. Three weeks' wages became due, and she was forwarded 7s. 2½d. as the remuneration for twenty-one days' unceasing occupation from morning till night, being 2s. 6½d. per week, or fourpence farthing per day." Fourpence farthing a day!

When Irish labor stood at starvation-point, some thirty years ago, the able-bodied farm servant received never less than sixpence per diem; and it will not be the fault of Mr. Lowe—for, perhaps, the "Second Secretary" is not originally to blame—if our Irish girls trained in the nice art of Telegraphy are not reduced to water-gruel and charity petticoats. The "economic fit" which has seized the Department would, probably, curtail even the breadth of those pauper skirts.

The other story is that—In a town, also in the County Cork, another postmaster's daughter was appointed to a post at 12s. per week. When the economic fit came on, she got notice that she would be reduced to 6s. per week. But she refused to work at the reduced rate, and a clerk was sent down from Cork to supply her place, drawing 30s. a week. This, of course, was only intended as a temporary measure, until a cheap operator could be procured. None such turned up, and at last it was found necessary to ask the postmaster's daughter to resume the position. She now saw her advantage, and, naturally resenting the glaring injustice, refused to comply with the request without an *increase* of salary. Finally, she was reinstated at 15s. per week! The *economy*, in this instance, produced its natural recoil; and we are convinced that, whether the strike hands in Dublin accept the Scudamore amnesty or not, the end of the matter will be a larger outlay on the Department, than if it had been managed from the start on fairer principles.

WE regret to have to record the death of Miss Kate Denny, Manager of the office of the Western Union Telegraph Co., at Easton, Pa., in that place on Monday, January 22d, after an illness of about four days. We sincerely mourn on the occasion of this death, for Miss Denny was a true and faithful woman, kind, exemplary and obliging, who never had to be called twice when on duty.

TRANSFER SERVICE.

New Money Order Office opened Feb. 1., at *Alpena, Mich.* E. P. WRIGHT, Transfer Agent.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
February 1, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since Jan. 15, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

368 Adrian, Ill.
357 Aledo, "
96 Amelia C. H., Virginia, re-opened.
368 Basco, Ill.
336 Brimfield, "
336 Bradford, "
251 Brady, Mich. Heretofore another line office.
356 Buena Vista, Iowa,
381 Brinckley, Arkansas, re-opened.
Cornelius, Or., tariff same as Portland, Or.
180 Clinton, O.
366 Clayton, Iowa.
336 Castleton, Ill.
130 Cash-Up, Pa.
368 Caluza, Ill.
377 Carman, "
266 Cave Spring, Ga.
368 Dallas, Ill.
317 Dayton, "
336 Duncan, "
368 Ferris, Ill. re-opened.
307 Fox, "
356 Guttenburg, Iowa.
* Gibralter, Mich.
317 Grand Ridge, Ill.
203 Huntington, W. Va.
[NOTE.—Huntington is at present an Other Line Ofs., but will be a W. U. and check direct Ofs. on and after Feb. 10.]
317 Indian Creek, Ill.
347 Ipava, Ill.
357 Joy, "
112 Kittanning Point, Blair Co., Pa.
326 La Moille, Ill.
368 Lomax, "
368 Loraine, "
151 Mingo Junction, Ohio.
468 Muskogee, Indian Ter.
494 Manor, Texas.
357 New Boston, Ill.
357 New Windsor, "
357 Nekoma "
* Ninety Six, S. C.
211 New Boston, Mich.
326 Ohio, Ill.
368 Oakland Ill.
367 Oxford Junction, Jones Co., Iowa.
114 Pamplin's, Va. re-opened.
346 Prophetstown, Ill.
Red River, New Mexico, tariff same as Trinidad, Col.
368 Rushville, Ill.
447 Rankin, Mo.
326 Sheridan, Ill.
317 Serena, "
368 Stillwell, "
25 Spencer, Mass. Heretofore another line office.
336 Lombard, "
356 Specht's Ferry, Iowa.
356 Turkey River, "
346 Tampica, Ill.
368 Ursa, "
357 Viola, "
357 Woodhull, "
326 Williams, "
346 Walnut, "
368 West Point, "
307 Yorkville, Ill. Heretofore another line Office.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.		Leaves this Line.
Gibralter, Mich.,	30	2	Huron, Mich.
Ninety-Six, S. C.,	50	3	Columbia, S. C.

OFFICES CLOSED.

Beattie, Ks.; Gibson, Ind. Terr.; Green Top, Mo., and Hepler, Kansas.

GENERAL INFORMATION.

The following is a list of offices on the Chesapeake and Ohio Telegraph Line, with tariff from Huntington, W. Va. (see Note after Huntington, given above), instead of Catlettsburg, Ky., as heretofore, and Greenbriar, White Sulphur Springs, Va. Business to be sent and checked via the cheaper route.

Barboursville, W. Va.	35	3	Huntington, W. Va.
	85	6	Greenbriar, W. S. Spgs., Va.
Big Bend Tunnell, W. Va.	30	5	Huntington, W. Va.
	40	3	Greenbriar, W. S. Spgs., Va.
Charleston, Kanawha Co."	45	4	Huntington, W. Va.
	75	5	Greenbriar, W. S. Spgs., Va.
Millers Ferry, W. Va.	60	4	Huntington, W. Va.
	60	4	Greenbriar, W. S. Spgs., Va.
Richmond Falls, W. Va.	75	5	Huntington, W. Va.
	45	4	Greenbriar, W. S. Spgs., Va.
St. Albans, W. Va.	40	3	Huntington, W. Va.
	80	5	Greenbriar, W. S. Spgs., Va.
Stretchers Neck, W. Va.	70	5	Huntington, W. Va.
	50	4	Greenbriar, W. S. Spgs., Va.

The name of the office heretofore known as Newport, Luzerne Co., Pa., has been changed to Wanamie, Pa., and business should be checked to Wilkesbarre, Pa.

Hereafter business for Marion and Hudson City, N. J., will be checked to Jersey City, N. J., at the Jersey City rate.

Business for Topton, Pa., will hereafter be checked direct, instead of to Lyons, Pa., as heretofore.

The P. O. address of Lake, Ind., is Lake Station, Lake Co., Ind.

378 Bowling Green, Ky., new office, given in last JOURNAL, should read 378 Bowling Green, Mo.

The office at 140 Kittanning, Pa., is in Armstrong Co.

Richmond Falls, W. Va., is also known as New Richmond, W. Va.

OFFICES HAVING "SPECIAL SHEET A"

Will hereafter check Spencer, Mass., same as "special rate" to Worcester, Mass., and Hoboken, N. J., same as "special rate" to Jersey City, N. J.

ATLANTIC CABLE BUSINESS.

We are notified that hereafter the "*Station from*" must in all cases be inserted, and *paid for*, in messages beyond Great Britain and Ireland.

WILLIAM ORTON, President.

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TELEGRAPHERS' LIFE INSURANCE ASSOCIATION.

UNPAID ON ASSESSMENT NO. 24, JAN. 23d, 1872.

*1	*3	4	†7	*9	*10	*11	‡12	*14	*18
*20	*24	*32	*35	*36	*37	*38	43	*45	*47
*48	*50	*57	*62	*63	*66	*68	‡73	*79	*81
*85	‡87	*92	‖94	*96	*102	*105	*109	*110	*112
*115	*116	†118	*119	*123	*124	*125	‖128	*130	*132
133	*135	*137	*147	*149	*151	*152	*155	*159	*161
‖163	*165	*167	*168	†169	*170	*173	*174	181	†183
*184	*194	*195	*196	*203	*204	*205	*207	*212	*214
*216	*219	‖221	*222	*223	*224	†225	*226	*229	*234
*236	*241	†248	*249	*250	256	*260	*261	262	263
264	265	266	*268	‖270	*272	‡284	289	*290	*292
*293	*295	*296	*299	*300	*304	†305	‖306	‖307	‖308
‖309	*310	*313	*314	*317	*320	*321	†322	*324	*325
*326	*329	*331	*334	‖335	†336	‖337	*338	*339	340
†343	*345	*348	*355	‡356	357	*358	359	‡360	361
362	*363	364	*365	366	*368	*369	*370	*373	‡374
*375	*377	382	*384	*387	*390	†395	‖396	*399	*400
*401	*403	*404	‡407	*408	*409	*410	412	‡413	*415
*419	*421	*423	*424	‖427	*432	*436	*439	440	*442
†443	*444	‖446	*448	‡449	†450	*452	456	*458	*460
462	*465	*472	*473	477	*479	*480	*486	*487	†488
*489	*490	*491	*492	*493	*498	‖501	*502	*513	†516
‖517	*518	*519	*521	*522	523	*525	*529	*530	*531
533	*534	*535	‖537	*538	*539	*540	*541	*543	*544
*545	*550	*553	*558	*559	*563	*567	*568	*571	*572
573	575	*578	*580	†581	*582	583	584	‡585	587
*589	*591	*593	*596	*598	*599	*601	*606	*607	*609
*610	*611	*612	*613	*614	616	†619	*620	*621	622
*624	‡625	631	*633	*634	†635	†636	*637	*038	*640
*641	‡643	*644	*645	*647	*650	*651	‖652	*653	*654
*657	*658	666	*668	670	†671	*673	*674	*675	‖677
*681	*682	*683	†686	*687	*688	*689	*691	*693	*696
*699	*705	*706	†707	*709	*713	*718	*719	726	†727
734	*736	*739	*745	*746	‖747	‖748	‡749	*752	*753
*754	*755	*757	*759	*760	*761	763	*765	*767	*768
*770	777	*779	*788	*789	*792	*793	*794	*796	*805
*806	*807	*810	*811	*816	‡818	*819	*824	*826	*827
*828	*829	*833	*834	*835	†837	*839	*840	†843	*845
*846	*847	*849	‖852	*853	*854	*855	*857	*860	*861
‖862	*863	*864	*865	‖866	*867	*872	*877	*879	880
*881	‖884	*885	*887	*888	*889	*890	*891	*892	*893
*894	*895	*898	900	‖902	*903	†909	*913	*919	†920
*921	*924	*925	*928	*933	*936	*937	*947	‡948	949
*950	953	*961	‖962	*965	*967	†968	*969	*970	*971
*972	*973	*974	‖975	*981	*982	*983	*984	‡985	‡986
†987	*988	*989	†990	*993	*997	*999	1003	*1004	†1007
‡1010	*1012	1013	*1015	1017	‖1018	*1020	*1021	*1022	‡1027
‖1036	†1037	1044	†1045	†1049	‖1051	‖1052	†1060	†1063	†1064
*1065	‡1067	‖1068	‡1070	‖1078	*1082	‖1083	‡1089	1091	†1092
‡1095	‡1096	†1097	†1098	1100	1101	†1114	‡1124	†1128	1129
‖1138	‖1140	1143	†1171	†1176	‡1179	1184	1196	1197	†1204
†1206	1209	1217	1218	1219	1242	1243	1247	†1249	1259
1260	1261								

EXPLANATION.

1. A number without an accompanying sign indicates that the holder of that certificate owes only assessment No. 24.

2. * Indicates that the holder has resigned, has been dropped for default, or is dead.

3. † Indicates that the holder owes assessments 23 and 24.

4. ‡ Indicates that the holder owes assessments 22, 23 and 24.

5. ‖ Indicates that the holder owes 21, 22, 23 and 24.

6. All certificates not recorded above are understood to be paid up.

The whole number of certificates issued to date is 1375.

THE Telegraph Construction and Maintenance Company have signed a contract with the Messrs. Bischoffsheim for the laying of an Atlantic telegraph cable from Great Britain to New York direct.

THE JAPS AND THE TELEGRAPH.

The members of the Japanese Embassy visited the Western Union Telegraph Office in San Francisco, at 4 p. m. January 23d, and were enabled to communicate direct with the Secretary of State at Washington, with Professor Morse, President Orton and others, and with the sons of the chief Ambassador, Prince Iwakura, now attending school at New Brunswick, N. J. The wires were connected through, and the following despatches were interchanged:

FROM THE SECRETARY OF STATE.

WASHINGTON, Jan. 23, 1872.

The Secretary of State congratulates the Japanese Minister on his arrival, and tenders a cordial welcome to the United States to himself and Embassy.

REPLY OF PRINCE IWAKURA.

SAN FRANCISCO, Jan 23, 1872.

Hon. HAMILTON FISH, Secretary of State:

Many thanks for your kind welcome to the United States. We shall leave here next week for Washington, when we shall have the honor of meeting personally and presenting our credentials as Ambassadors Extraordinary from His Majesty the Tenno of Japan to the treaty Powers.

Very respectfully,

IWAKURA, Ambassador Extraordinary.

THE PRESIDENT'S GREETING.

WASHINGTON, Jan. 23, 1872.

Prince IWAKURA, Ambassador Extraordinary, San Francisco:

The President will be much pleased to receive yourself and the Embassy, and hopes that your journey across the Continent may be agreeable and safe. You will meet in the American people and government friends looking with warm interest to all that relates to your country, and to the future relations between the Tenno government and the United States. The advent of such an embassy marks an epoch in the history of both nations.

HAMILTON FISH, Secretary of State.

FROM PROFESSOR MORSE.

NEW YORK, Jan. 23, 1872.

Professor Morse presents his best respects to the Japanese Ambassador, and welcomes him to the sphere of telegraphic intercourse.

THE REPLY.

SAN FRANCISCO, Jan. 23, 1872.

Professor MORSE:

The Embassy from Japan desire to inform Professor Morse, the inventor of the electric telegraph, that his fame is well known in Japan, and that within a few months one thousand miles of telegraph wire will be opened for business in their country.

IWAKURA, Ambassador Extraordinary.

FROM MR. ORTON.

NEW YORK, Jan. 23, 1872.

IWAKURA, Ambassador Extraordinary, San Francisco:

The President of the Western Union Telegraph Company presents his respectful compliments to the Ambassador Extraordinary of Japan, and tenders the use of the lines in the United States whenever His Excellency may desire them.

W. ORTON.

THE ANSWER.

SAN FRANCISCO, Jan. 23, 1872.

President WILLIAM ORTON and Vice-President MUMFORD:

Accept the sincere thanks of myself and associate Ambassadors for your kindness in placing such wonderful telegraphic facilities at our disposal.

IWAKURA, Ambassador Extraordinary.

FROM MR. MUMFORD.

NEW YORK, Jan. 23, 1872.

IWAKURA, Ambassador Extraordinary, San Francisco:

We shall be pleased to see you at the end of the line, and to have you inspect our office in New York, from which we greet you.

GEORGE H. MUMFORD.

FROM THE SONS OF IWAKURA.

NEW BRUNSWICK, N. J., Jan. 23, 1872.

IWAKURA, San Francisco:

Affectionate Father: We rejoice to hear from you. We wait for you in Chicago when we receive your advice.

TATO, MINAMI, ASASSI.

IWAKURA TO HIS SONS.

To TATO, MINAMI, ASASSI, Brunswick:

My Sons: I rejoice to hear of your welfare, and of the kind treatment you have received in America. We shall probably leave here during the middle of next week for Washington direct. Will advise you when to start to meet me in Chicago.

Your affectionate father, IWAKURA.

The wires never worked more perfectly, and the telegraphic interview was brief and delightful.

WE chronicle the arrival at Rome of Mr. Cyrus W. Field, from New York, to whose energy and perseverence we owe the Trans-Atlantic Telegraph. Mr. Field is a director of, and represents the company which owns the cable, and he has come to Rome to attend the International Telegraph Congress. It is understood that among other subjects to be discussed at the meeting, the American representative will propose to the congress the necessity of making a treaty between the powers of the old and new worlds, to whose interest it will be to guarantee the integrity and security of the ocean cables in time of war. The importance of this feature will be well understood when we refer to the events of the recent Franco-German war. We refer to the time when, in consequenee of some accident, the two cables which united England with the United States were insensible to the electric current. Telegraphic communication was thus suspended between these two countries for a period of several months. By good luck the cable which connected America with France continued to work. The French government used it on a large scale to order arms and munitions of war from New York. The French government thus gained from ten to twelve days in sending its orders, which time would have been lost if they had been obliged to send by mail. Prussia had the power during the war to cut the end of the cable on French territory so as to sever all communication. She did not do so and is therefore entitled to the thanks of all civilized powers. It is uncertain whether any other power would have been so scrupulous. It is therefore necessary to provide against all future contingencies, and, in the interest of the whole world, to prevent the ruin of such a gigantic enterprise whose principle object is to aid and protect commerce and industry. In adhering to the projected suggestion of Mr. Field the European powers will but imitate the ancient Greeks who bound themselves by an oath to respect, during time of war, the aqueducts which furnished water to the inhabitants of the neighboring cities. We know that the United States have already given their sanction to Mr. Field's proposal. We will also state that if Mr. Field merits the gratitude of all, by his having connected the two worlds by an electric current, he has also a special claim to our remembrance by the indefatigable zeal with which he has at all times promoted our country's cause. Mr. Field's name appears among the list of our Presidents who took part in the famous Reunion held in New York at the beginning of the year to celebrate the "Unity of Italy." All honor to Mr. Field, and we wish him a long prosperity and the success of his philanthrophic ideas.—*From the Roma L'Opinione, Roma.*

BORN.

At Plaister Cove, Cape Breton Island, January 11, to S. E Barton, a son—good sounder—and sends with left hand.

MARRIED.

CLEMANS—NEER—Monday Evening, Jan. 1, 1872. by Rev. J. G. Black, Mr. L. T. Clemans, Manager Western Union Telegraph at Urbana, Ohio, and Miss Sarah C. Neer, of Concord township.

DODD—ARMSTRONG—At Leroy, Mo., January 14, Geo. A. Dodd Manager W. U. Tel. Office, to Miss Lillian Armstrong, both of Girard, Kansas.

HUGGINS—PHELPS—At Mansfield, Ohio, Dec. 26, by the Rev. S. McBurney, W. J. Huggins, Opr. W. U. Tel. Office, Mansfield, O., and Emily Ogella Phelps, of same city.

MIXER—CHAPMAN—At Rochelle, Ill., January 16, 1872, Mr. C. L. Mixer, Manager W. U. T. Office, Geneva Lake, Wis., and Miss M. H. Chapman, of Phœnix, N. Y.

SKINNER—BURGESS—At St. Barnabas Church, Omaha, Neb. Wednesday Eve., January 12, 1872, by the Rt. Rev. Bishop Clarkson, assisted by Rev. G. F. Betts, Mr. Charles K. Skinner, Agent of C. & N. W. Ry., and Manager of the W. U. Tel. Co., to Miss Abbie H. Burgess, daughter of Rev. R. Burgess, all of Woodbine, Iowa.

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N. B.—This Supplement takes the place of that issued with last Journal.

NORTH-WESTERN TELEGRAPH COMPANY.

TARIFF FROM CHICAGO,

TO TAKE EFFECT FEBRUARY 12th, 1872.

Chicago is now the connecting point between the Western Union and North-Western Telegraph Companies. The *"Tariff for this Line"* on business for North-Western Co.'s offices will be *the present Western Union rate to* CHICAGO, ILL. Business will be checked as heretofore, to Chicago.

Offices on "Special Sheet A" which have a special rate to any North-Western offices will continue to use such special rate until further notice.

Chicago, to—		
Adams, Minn	100	7
Aiken, Minn	150	10
Algona, Iowa	125	8
Anoka, Minn	100	7
Appleton, Wis	50	3
Arena, Wis	50	3
Atwater, Minn	150	10
Austin, Minn	100	7
Avoca, Wis	60	4
Bangor, Wis	75	5
Beaver Dam, Wis	40	3
Baraboo, Wis	50	3
Belle Plaine, Minn	100	7
Beloit, Wis	40	3
Benson, Minn	150	10
Berlin, Wis	50	3
Big Lake, Minn	125	8
Black Earth, Wis	50	3
Blakeley, Minn	100	7
Blooming Prairie, Minn	100	7
Blue River, Wis	60	4
Boscobel, Wis	60	4
Brainerd, Minn	150	10
Brandon, Wis	40	3
Breckenridge, Minn	150	10
Brentwood, Minn	100	7
Bridgeport, Wis	75	5
Britt Iowa	125	8
Broadhead, Wis	30	2
Brookfield, Wis	25	2
Buffalo River, Minn	200	13
Burnett, Wis	40	3
Byron, Minn	100	7
Calmar, Iowa	75	5
Cambria, Wis	40	3
Campbell, Minn	150	10
Carpenter, Iowa	100	7
Carver, Minn	100	7
Castalia, Iowa	75	5
Cedarburgh, Wis	25	2
Cedar River, Mich	100	7
Centreville, Mich	150	10
Chester, Wis	40	3
Chickasaw, Iowa	100	7
Claremont, Minn	100	7
Clear Lake, Iowa	100	7
Clear Lake, Minn	125	8
Columbus, Wis	40	3
Counover, Iowa	75	5
Cresco, Iowa	75	5
Cross Plains, Wis	50	3
Crow Wing, Minn	150	10
Darwin, Minn	125	8
Dassel, Minn	125	8
Deansville, Wis	40	3
Decorah, Iowa	100	7
Delano, Minn	125	8
Depere, Wis	75	5
Detroit Lake,	150	10
Dodge Centre, Minn	100	7
Duluth, Minn	150	10
Dundas, Minn	100	7
Edgerton, Wis	30	2
Elk River, Minn	125	8
Elm Grove, Wis	25	2
End of Track, N. P. R. R., Minn		
Escanaba, Mich	125	8
Etter, Minn	100	7
Evansville, Wis	40	3
Eyota, Minn	75	5
Fall River, Wis	40	3
Fargo, D. T	225	15
Faribauld, Minn	100	7
Farmington, Minn	100	7
Fond du Lac, Minn	150	10
Fond du Lac, Wis	40	3
Forest Lake, Minn	100	7
Fort Atkinson, Iowa	100	7
Fort Atkinson, Wis	30	2
Fort Garry, B. N. A	225	15
Fort Ripley, Minn	150	10
Fox Lake, Wis	40	3
Frontenac, Minn	100	7
Garner, Iowa	100	7
Giard, Iowa	75	5
Grand Forks, D. T	200	13
Granville, Wis	25	2
Green Bay, Wis	60	4
Greenfield, Wis	75	5
Hamilton, Minn	100	7
Hanover, Wis	30	2
Hartford, Wis	25	2
Hartland, Wis	25	2
Hastings, Minn	100	7
Hermann, Minn	150	10
Heron Lake, Minn	150	10
Hersey, Minn	150	10
Hinckley, Minn	125	8
Horicon, Wis	40	3
Houghton, Mich	200	13
Hudson, Wis	100	7
Iron Mountain, Wis	25	2
Iron Ridge, Wis	25	2
Janesville, Minn	100	7
Jefferson, Wis	40	3
Juda, Wis	30	2
Juneau, Wis	40	3
Kasson, Minn	100	7
Kellogg, Minn	100	7
Kettle River, Minn	125	8
Kilbourn City, Wis	50	3
La Crosse, Wis	75	5
Lake City, Minn	100	7
Lake Crystal, Minn	150	10
Lansing, Minn	100	7
Lawler, Iowa	100	7
L'Anse, Mich	200	13
Leaf River, Minn	150	10
Leroy, Minn	100	7
Le Sueur, Minn	150	10
Lewiston, Minn	75	5
L. Ishpeming, Mich	175	12
Lime Springs, Iowa	100	7
Litchfield, Minn	150	10
Little Falls, Minn	150	10
Little Suamico, Wis	75	5
Lodi, Wis	50	3
Lone Rock, Wis	60	4
Long Lake, Minn	125	8
Lowell, Wis	40	3
Luana, Iowa	75	5
Lyle, Minn	100	7
Lyndon, Wis	60	4
Madelia, Minn	150	10
Madison, Wis	40	3
Manitowoc, Wis	50	3
Mankato, Minn	150	10
Marinette, Wis	75	5
Marquette, Mich	175	12
Mason City, Iowa	100	7
Mauston, Wis	60	4
Mazomanie, Wis	50	3
McFarland, Wis	30	2
Medford, Minn	100	7
Mendota, Minn	100	7
Menomonee, Minn	75	5
Merrimac, Wis	50	3
Middleton, Wis	50	3
Milton, Wis	30	2
Milton Junc., Wis	30	2
Mil. Stock Y'ds, Wis	10	1
Minn City, Minn	75	5
Minneapolis, Minn	100	7
Minneiska, Minn	100	7
Minn Junc., Wis	40	3
Monona, Iowa	75	5
Monroe, Wis	40	3
Moose Lake, Minn	150	10
Morris, Minn	150	10
Muscoda, Wis	60	4
Nashotah, Wis	25	2
Neenah, Wis	50	3
Negaunee, Mich	175	12
New Hampton, Iowa	100	7
New Lisbon, Wis	60	4
North Branch, Minn	100	7
Northfield, Minn	100	7
N. P. R. R. Junc., Minn	150	7
North Prairie, Wis	25	2
Oak Lake, Minn	200	13
Oconto, Wis	75	5
Omro, Wis	50	3
Oregon, Wis	30	2
Oshkosh, Wis	50	3
Ossian, Iowa	75	5
Otsego, Wis	40	3
Ottawa, Minn	150	10
Owatonna, Minn	100	7
Ozaukee, Wis	25	2
Orford, Wis	30	2
Palmyra, Wis	25	2
Pardeeville	50	3
Pembina, D. T	225	15
Pensaukee, Wis	75	5
Peshtigo, Wis	75	5
Pewaukee, Wis	25	2
Pine City, Minn	150	10
Plymouth, Iowa	100	7
Plymouth, Wis	40	3
Portage City, Wis	50	3
Postville, Iowa	75	5
Prairie du Chien, Wis	75	5
Prescott, Wis	100	7
Ramsey, Minn	100	7
Randolph, Wis	40	3
Redwing, Minn	100	7
Reedsburg, Wis	60	4
Reeds Landing, Minn	100	7
Ritchfield, Wis	25	2
Ridgeway, Iowa	100	7
Rio, Wis	50	3
Ripon, Wis	50	3
River Falls, Wis	100	7
Rochester, Minn	100	7
Rolling Prairie, Wis	40	3
Rosemount, Minn	100	7
Rubicon, Wis	25	2
Rudd, owa	100	7
Rush City, Minn	150	10
Rush Lake, Wis	50	3
St. Anthony, Minn	100	7
St. Charles, Minn	75	5
St. Cloud, Minn	150	10
St. James, Minn	150	10
St. Paul, Minn	100	7
St. Paul Junc., Minn	100	7
St. Peter, Minn	150	7
Sauk Rapids, Minn	150	7
Saukville, Wis	25	2
Schleisingerville, Wis	25	2
Shakopee, Minn	100	7
Sheboygan, Wis	40	3
Sheyenne Crossing, D. T	200	13
Sicottes, Minn	150	10
Smith Lake, Minn	125	8
Sparta, Wis	75	5
Spring Green, Wis	50	3
Stillwater, Minn	100	7
Stoughton, Wis	30	2
Sun Prairie, Wis	40	3
Thiensville, Wis	25	2
Thompson, Minn		
Tomah, Wis	75	5
Trempeleau, Wis	75	5
Two Rivers, Wis	50	3
Wabasha, Minn	100	7
Waseca, Minn	125	8
Waterloo, Wis	40	3
Watertown, Wis	25	2
Waukau, Wis	50	3
Waukesha, Wis	25	2
Waumakee, Wis	50	3
Waupun, Wis	40	3
Wauzeka, Wis	60	4
Wayzata, Minn	125	8
Welwood, Minn	150	10
West Salem, Wis	75	5
White Bear Lake, Minn	100	7
Whitewater, Wis	25	2
Willmar, Minn	150	10
Winneconne, Wis	50	3
Windom, Wis	150	10
Winona, Minn	75	5
Winona Junc., Wis	75	5
Woodland, Wis	25	2
Woodman, Wis	65	4
Wonewoc, Wis	60	4
Worthington, Wis	150	10
Wrightstown, Wis	70	5
Wyocena, Wis	50	3
Wyoming, Minn	100	7

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MONTREAL TELEGRAPH COMPANY.

The imposing edifice which has just been taken possession of as the Toronto offices of this Company is not more striking in the harmony of its proportions and the elegance of design perceptible in its exterior than in the ingenuity, convenience and good taste with which its internal appointments have been adjusted. Every want detected by a keen sagacity during an experience of twenty-five years has been met; every possible accessory to the despatch of the Company's expanded business seems to have been carefully supplied.

Entering the main door on the corner of Scott and Wellington Streets, you find a spacious and well lighted and finished Receiving Room divided by a carved walnut counter, behind which stand the Receiving clerks; against the wall in front of the counter is a desk affording ample accomodation to the public for writing telegrams. From this room messages are conveyed by pneumatic tubes to the Superintendent's room one story, or the operating room two stories above; this is done instantaneously. From the same room the messages are delivered to the carriers by a wicket which communicates with the adjoining lobby. A capacious safe connected with this room contains sets of pigeon holes sufficient to accommodate copies of the messages for a period of eight months, each days despatches been kept entirely separate. There is also an inner safe for the use of the cashier. One flight of stairs above is the private office of the Superintendent, Mr. H. P. Dwight, connected by speaking tubes with all the other offices. Adjoining this room is that of Mr. B. Toye, the Assistant Superintendent. A room 40 x 60 feet in the front of this story is occupied by the Mercantile Agency of Messrs. Dunn, Wiman & Co., an institution well known and esteemed by our wholesale merchants as a reliable source of information relating to trades and traders. The entrance to these rooms is by the side door opening off Wellington Street. The next story is intended exclusively for the operating department, and contains sufficient accommodation for seventy lines. The room is divided in order to provide a separate department for ladies, whom it is intended to employ as opportunities arise.

The wires converge at the cupola and are brought directly down to a neat walnut case enclosing the "switch" from which they are led, carefully insulated beneath the floor, to the different operating tables.

On the third story is the battery room which supplies the power of all the work that is carried on in the operators' room.

One hundred and fifty new offices were opened last year, the total number of offices on the Company's lines and its immediate connections being 895, viz., in Ontario, 430; Quebec, 215; United States, 130; New Brunswick, 66; and in Nova Scotia, 54. The total uumber of offices of the Company and its immediate connections in the Dominion is 765, scattered from the remote points in Gaspé, in Quebec, to the extreme western section of Ontario. The total length of the wire is about 15,000 miles. Extensions more considerable than any made heretofore, are projected for next season.

Like most of the enterprises with which Sir Hugh Allen is associated, the Montreal Company has been one continued success. His wise counsel and prudent oversight has ever been employed in furthering its interests and directing its operations.

The Snperintendent in this western field, Mr. H. P. Dwight, is the life and soul of the Company, and his characteristic energy has been largely infused into it.

ELECTRIC TELEGRAPH WORKS.

FLEMING, POTTER & CO.,

N.-W. Cor. SECOND & CHESTNUT STS., PHILADELPHIA,

MANUFACTURERS of every description of

TELEGRAPH INSTRUMENTS,

ELECTRICAL APPARATUS, and

RAILWAY SIGNALS, &c.

☞ Inventor's models carefully attended to. ☜

WILLIAM E. DAVIS,

Manufacturer and Dealer in

TELEGRAPH INSTRUMENTS,

319 Newark Avenue, Jersey City, N. J.

Now offers for sale, or will manufacture to order:

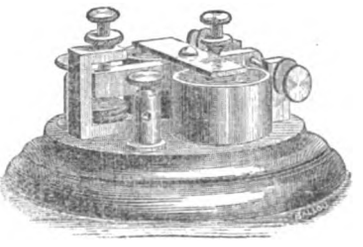
REGISTERS,
RELAYS,
LOCAL SOUNDERS,
MAIN SOUNDERS,
KEYS,
SWITCHES,
INVENTORS' MODELS, &c.

☞ *Charges for workmanship moderate.* ☜

M. A. BUELL,

Manufacturer and Dealer in all kinds of

Telegraph Supplies.



A VERY FINE NEW STYLE

SMALL SOUNDERS,

Polished Rubber Covered Magnets, $6.00.

The same, on Mahogany Base and Silver Plated, . . . $9.00

Agent for

Pope's Nonpareil Apparatus,

AND

PUTT & CO.'S MECHANICAL INSTRUMENTS

FOR LEARNERS.

Above Instruments kept constantly on hand at manufacturers' prices.

Materials for Private Telegraph Lines,

With instructions for putting up and operating.

M. A. BUELL,

26 Waring Block, Cleveland, Ohio.

AMERICAN FIRE ALARM AND POLICE TELEGRAPH.

GAMEWELL & CO., PROPRIETORS,

NO. 104 CENTRE STREET, NEW YORK.

J. W. STOVER,
General Agent and Superintendent.

L. B. FIRMAN, Chicago, Ill.,
General Agent for the West and North West.

J. R. DOWELL, Richmond, Va.,
Special Agent for Virginia and North Carolina.

J. A. BRENNER, Augusta, Ga.,
Special Agent for Georgia and South Carolina.

L. M. MONROE, New Canaan, Conn.,
Special Agent for New England.

This system of Fire Alarm and Police Telegraph, with a Central office, or upon the

AUTOMATIC PLAN,

is now in operation in the following cities, to which reference is made for evidence of its great SUPERIORITY, VALUE and UNIFORM reliability:

Albany, N. Y.,	New Orleans, La.,
Alleghany, Pa.,	New Haven, Conn.,
Boston, Mass.,	Newark, N. J.,
Buffalo, N. Y.,	Omaha, Neb.,
Baltimore, Md.,	Philadelphia, Pa.,
Chicago, Ill.,	Pittsburg, Pa.,
Cincinnati, Ohio,	Portland, Me.,
Columbus, Ohio,	Peoria, Ill.,
Cambridge, Mass.,	Providence, R. I.,
Charlestown, Mass.,	Quebec, L. C.,
Covington, Ky.,	Rochester, N. Y.,
Detroit, Mich.,	Richmond, Va.,
Dayton, Ohio,	ndianapolis, Ind.,
Elizabeth, N. J.,	t. Louis, Mo.,
Fall River, Mass.,	St. John, N. B.,
Fitchburg, Mass.,	Springfield, Mass.,
Hartford, Conn.,	San Francisco, Cal.,
Jersey City, N. J.,	Savannah, Ga.,
Louisville, Ky.,	Syracuse, N. Y.,
Lawrence, Mass.,	Troy, N. Y.,
Mobile, Ala.,	Toledo, Ohio,
Montreal, Canada,	Toronto, Canada,
Milwaukee, Wis.,	Washington, D. C.,
New York City,	Worcester, Mass.,
Lynn, Mass.,	New Bedford, Mass.,
Lowell, Mass.,	Bridgeport, Conn.

The distinctive features of these systems of

FIRE ALARM AND POLICE TELEGRAPHS,

ARE,

First—The AUTOMATIC SIGNAL BOXES, the simple electro-mechanism of which enables any one—even a child—to give an *instantaneous*, *general*, and *definite* alarm of fire.

Second—The AUTOMATIC REPEATER, through which the apparatus may be distributed in a combination of circuits, and the entire system successfully worked without the constant personal attention of either operators or watchmen.

Third—The ELECTRO-MECHANICAL BELL STRIKERS, adapted to produce the full tone of the largest church or tower bells.

Fourth—The ELECTRO-MECHANICAL GONG STRIKER, for hose and engine houses, by means of which the location of the fire is instantaneously communicated to the members of each fire company.

These features combined form the

ONLY PERFECT, COMPLETE, AND RELIABLE SYSTEM

OF

FIRE ALARM TELEGRAPH IN THE WORLD.

Messrs. GAMEWELL & CO. are the owners of the original *FARMER AND CHANNING PATENTS*, one of the most important of which has just been extended for seven years. During the past seventeen years they have spared no expense or effort to secure improvements, and the systems are now covered by

MORE THAN TWENTY PATENTS.

The introduction and operation of the

AUTOMATIC SYSTEM

involves so little expense, compared to the benefit which it confers, that even small communities can profitably adopt and maintain it.

The co-operation of TELEGRAPHERS in securing its introduction into their localities is cordially invited, and their efforts will be duly appreciated and compensated.

Any information desired in regard to the above system will be cheerfully and promptly furnished upon application at the office.

A pamphlet setting forth more fully its advantages and superiority, has been printed, and will be supplied to Municipal Authorities and others interested in Fire Alarm and Police Telegraphy upon application as above.

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ATTENTION OPERATORS !

PATENTED.



We would call your attention to our

TELEGRAPH OPERATORS' BADGE PIN.

Having completed our arrangements to manufacture, by putting in new machinery, and with a full force of workmen, we are now ready to supply the GREAT DEMAND for these Badge Pins. They are made of 18k gold, and are perfect fac-simile of the present MORSE, or curved lever keys, and the new style WESTERN UNION straight lever and FANCY BASE KEYS. We are now making two different sizes, one to be three-quarters of an inch long, and the other one inch long. Also, a very small, neat, BADGE KEY PIN for LADY OPERATORS. These are the only badge pins ever got up exclusively for Operators.

We are, also, manufacturing a complete set of RAILROAD BADGE PINS, for CONDUCTORS, BAGGAGE-MASTERS, BRAKEMEN, STATION AGENTS, and others, consisting of Punches, Passenger Cars (Pullman's Palace Pattern), Switch Targets, Coupon Tickets, &c. These Badges are all made of the most approved patterns.

PRICE LIST.

Key Pin, oval base, one inch long	$6 00
Key Pin, oval base, ¾ inch long	5 00
Key Pin, fancy base, one inch long	7 00
Key Pin, fancy base, ¾ inch long	6 00
Key Pin, oval base, (for Lady Operators)	5 00
Key Pin, fancy base, (for Lady Operators)	6 00
Key Pin Charm (for Watch Chain)	$5 00 and 6 00

☞ The above are made with straight or curved Levers. ☜

Conductor Punch Pin	$4 00
Passenger Car Pin (Pullman's Palace Pattern)	6 00
Switch Target Pin	4 00
Coupon Ticket Pin (enamel)	4 00

☞ The above are all made 18k gold (warranted). ☜

Persons ordering Key Pins, be particular in giving style of lever and base wanted.

Any of the above will be forwarded by express, C. O. D., or by mail, registered, by sending amount and twenty-five cents extra to pay postage and registration fee.

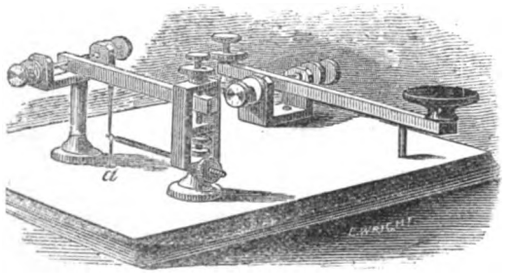
Address,

HARVEY & DOW,

ST. JOHNSBURY, Vermont.

MECHANICAL TELEGRAPH INSTRUMENT

PATENTED MAY 31st, 1870.



For Students, Colleges, &c. No battery required. An ordinary key and sounder is placed upon a proper base. The sounder is moved by a lever under the base, connected with the key, making a perfect instrument for those wishing to learn the Art of Telegraphy. An expert could not tell, without examining it, that the instrument was not worked by a battery.

It should be introduced into every school and family where there are those who wish to learn the Art.

Hundreds of persons throughout the country desire to become expert Telegraphists, and are constantly seeking permission to practice in the various telegraph offices.

This instrument is an outgrowth of this pressing demand. The Inventor is himself a practical operator, now in active service. Operators and others wishing to teach or learn the Art, will be delighted with this instrument.

It can be placed anywhere, as it does not occupy a space more than six inches square.

Its cost is but $7, and there is no expense whatever to keep it constantly in working order.

We will send a copy of SMITH'S MANUAL, free of charge, with each instrument, to individuals or clubs. The instructions in this Manual are particularly adapted to those who wish to learn by sound.

Special and liberal terms to manufacturers.

Remittances can be made by certified draft on New York, Cleveland, or Pittsburgh, money by express, charges paid, post office order, or registered letter at our risk.

Parties ordering instruments, from points except well-known cities, will please give the name of county and State.

Price, $7. Silver Plated, Extra Finish, $10.

Address, D. W. PUTT & CO.,
Wellsville, O.

D. W. PUTT,
P. BRUNER,
W. G. BROWNSON.

These instruments can also be procured at the same price from L. G. Tillotson & Co., New York; Bliss, Tillotson & Co., Chicago, Ill.; Chas. Williams, Jr., Boston, Mass.; M. A. Buell, Cleveland, O.

WIRE IN BOND.

For the accommodation of the

SOUTH AMERICAN, CUBAN and MEXICAN TRADE,

we shall hereafter keep a stock of the Celebrated

"JOHNSON" WIRE,

both plain and Galvanized, in Bond, ready for shipment from New York.

PRICES AS FOLLOWS:

No. 9, Plain Annealed	4½ cts. Gold.
No. 9, Galvanized	5¼ "
No. 8, Plain Annealed	4¾ "
No. 8, Galvanized	5 "

This Brand of Wire is the best in the world, and has been adopted exclusively by the Western Union and many other Telegraph Companies.

We also continue to import this Wire for use in this country, notwithstanding the high rate of duty imposed by Congress in the interest of the monopolists. Any amount of it can be seen at our store at all times. The import duty on wire is now two cents per lb. gold, and 15 per cent. *ad valorem.*

L. G. TILLOTSON & CO.,
No. 8 Dey Street, New York,

Bliss, Tillotson & Co.,
247 *So. Water Street, Chicago,*

Sole Agents in the United States for "Johnson's" Wire.

Manufacturers of every description of

Telegraph Instruments, Battery and Line Material.

CHAS. T. & J. N. CHESTER,

104 CENTRE STREET, N. Y.,

TELEGRAPH ENGINEERS,

And Manufacturers of

INSTRUMENTS, BATTERIES,

AND EVERY DESCRIPTION OF TELEGRAPH SUPPLIES,

Offer the best guaranty of excellence in their profession—in their long established business—in the extent and variety of their manufacturing facilities—in the many improvements introduced by them, now almost universally adopted or imitated—and in the extent of their business, domestic and foreign, enabling them to keep pace with telegraphic progress.

They publish an Illustrated Descriptive Catalogue of their leading manufactures, to which they respectfully refer.

SCREW GLASS INSULATORS AND BRACKETS,

Of the size and thread used by the Western Union Telegraph Company.

Having secured an Exclusive Agency for these Insulators, (manufactured under the Cauvet patent,) we are filling orders promptly for large or small quantities, at prices as low as any Insulator can be sold for in the market.

GRAY & BARTON,

479 State St., Chicago.

CHARLES WILLIAMS, Jr.,

(ESTABLISHED 1856,)

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OPINIONS.

NEW YORK, March 15, 1871.

Telegraph operators especially will find it almost indispensable after once having used it. All who have used it in this business speak very highly of it.

FRANK L. POPE,
Associate Editor of the "Telegrapher."

NEW YORK, April 21, 1871.

I fully accord in the above opinion of the Self-Supplying Pen-Holder, having tested it for some time.

SAMUEL F. B. MORSE.

FRANK L. POPE,

TELEGRAPHIC AND ELECTRICAL ENGINEER,

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 6. NEW YORK, FEBRUARY 15, 1872. WHOLE NO. 103.

TELEGRAPH TRAIN ORDERS.

To the Editor of the Journal of the Telegraph:

I was much pleased to notice an article by "Observer" in regard to train orders being given to both offices at once. He claims the advantage of saving time in not occupying the wire so long as the old system. I do not think his plan any more modern than others, as I know of lines that have used that plan for fifteen years, and it was not new then. I consider it however the most safe and reliable of any in use—ignoring the time saving part which is the least among the many advantages it secures. I claim for it greater safety than can possibly be attained by any other mode in use, and am surprised to see the attempt made by "Green Flag" to throw contempt on that of which he appears to be ignorant. As "Observer" is probably a commercial operator and may not be aware of the many advantages of using this mode, I will endeavor to reply to the inquiries in the JOURNAL of February 1st:

1st. It is of great advantage to the despatcher and to the trains, from the fact that the order for each train will read alike, therefore there will be no error in regard to the time, station or train mentioned in the order.

2d. It is an advantage to the operator who has the operator at the other office for proof, in case there is dispute in regard to wording of the order. Do not understand me that these orders are not repeated. They are repeated, as all orders must be to insure safety. In case the train having the right has not arrived at the station to which the order is sent, the operator will be required to repeat the order and give the signatures soon as train arrives. Soon as the operator has repeated the order, O. K. can be given to the other train so it can proceed. Some one will say, "but suppose the operator fails to deliver the order to the train having the right." I would say to him, "we have the same assurance of delivery that we have when an order is sent to an operator to hold one train until another arrives." The responsibility rests on the operator in either case. Green Flag gives a sample of an order asking how it can be put into one order. It can be done very simply, but if G. F. is in the habit of using such orders as the one he gives, allow me to assure him it is one of the worst orders that can be used, and will prove an expensive one to any road using it. But to my sample: No. 1 A, No. 2 B. } No. 2 runs to A regardless of No. 1. Whenever it is possible to avoid it no train should receive orders at the station where it meets another train, especially a "regardless" order—which should never be used for a meeting order. A much better sample would be like this: No. 1 A, No. 2 C. } No. 2 runs to B to meet No. 1; or, No 1 and No. 2 meet at B; or, if you give a time order: No. 1 A, No. 2 C. } No. 2 has until 4.20 P. M. to make B to meet No. 1. I feel confident in stating that no order in which two trains are interested can be given in any better way, and will be as readily understood by train men. Any one desiring to know any other particulars in regard to it I will be glad to explain.—*Western Despatcher.*

RAILROAD ORDERS.

JACKSONVILLE, ILL., Feb. 6th, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—In No. 102 of the JOURNAL, I notice an article written by "Green Flag," in which he desires to know how the following orders, to wit: "To op'r A—Hold No. 1 for No. 2. (2.) To cond'r and Eng'r No. 2, B—Run to "A" regardless of No. 1," could be embraced in one order. I think the following order would be all-sufficient, namely:—To conductors and engineers Nos. 1 and 2—Trains Nos. 1 and 2 will meet at "A." This would be a positive order; one that would hold No. 1 at "A" until No. 2 arrived, and give No 2 the right to run to "A" regardless of No. 1. In regard to the idea advanced by "Another Observer," I would say that there need not be any difficulty in regard to right to the road, as where an order is given in this way, the operator should repeat the message, and get O. K. where it is not practicable to get the understanding of the conductor and engineer. This would make him responsible for the correct delivery of the order.

It is high time that something should be done to relieve the wires of a great amount of unnessary business; especially where one wire has to serve as railroad and commercial. I know of instances where very important commercial messages have been delayed from six to twelve hours, just on this account; and on reporting it to the railroad superintendent, his answer was, "can't be helped, railroad business *must* have preference." And in a *great many* cases the railroad business referred to might have served the purpose equally well if sent by train.

Yours fraternally, "A."

RAILROAD ORDERS.

MICHIGAN, February 9, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—Here comes Observer No. 3, in regard to train orders, and I suppose I am the best qualified man in the party to decide this matter, having never sent a train an order in my life. I will endeavor to relieve Green Flag of his study in the following order. To Conductor and Engineer, No. 1 A and No. 2 B, meet and pass each other at A. We presume there is not an operator on any road, that would not know enough to hold No. 1, without an order to that effect. These orders should be repeated and Dispatchers' acknowledgement given to conductor and engineer.

We do not agree with Observer No. 1, in regard to not repeating, as we are all liable to mistakes, but we do think the plan we mention, is the safest in all respects. That is, send the same order to all trains and offices interested at the same time. I have been an operator for years, and never yet heard an order in regard to meeting and passing trains that could not be sent to all trains at the same time.

Truly yours, OBSERVER No. 3.

FROM THE SAME.

To the Editor of the Journal of the Telegraph:

I wish to say a word in regard to the manner trains are reported on some roads, which is this. Example, "AS KB No. 12 AT 230 D 1232 KB," making twenty letters and figures to report one train at each office. Would it not be better to say, "No. 12 AT," making fourteen less letters and figures to each train, at each office. This is quite an item, where there are fourteen trains and fifteen offices, to report them in one day. If a train is off of time, it is well enough to mention the time. The manner we first speak of is practiced on our road for the purpose of keeping freight trains down to twelve miles per hour. Would it not be better to run freights twenty-five miles per hour, and take the salaries which are paid to the conductors, engineers, brakemen and firemen, who would not be needed in this case, and hire trackmen; string out the men with picks, shovels and spikes is our motto, and let the cars run.

Our conductors, engines, cars, and in fact everything connected with freight business could do double the amount of work, and with half the expense. This, we think, is one of the great mistakes in railroad management. They run twelve and sixteen-wheel coaches fifty miles per hour, and confine an eight-wheel box car to twelve. Hoping this may do some good and no harm, I remain as ever,

OBSERVER No. 3.

TELEGRAPH OFFICE,
OAKLAND STATION, KY., Feb. 7th, 1872.

To the Editor of the Journal of the Telegraph:

Although not a regular reader of your valuable paper, I managed to get a glimpse of it now and then. I noticed a communication in your last number in reference to the running of trains.

I have been *railroading* for about six (6) years, and I think I know a little about the running of trains. The running of trains, both on the same order, is one of the plainest of ways. By so doing, both parties know just what to do and what the other party have to do. So it is a great help in case of break-downs or accident. As "T. D." says: Suppose you get "O. K." to one, and through carelessness, &c., you do not get "O. K." to the other, it would not work. In running the old way, it is just the same if you cannot get "O. K." to the orders.

In answer to "Another Observer" question, how the following could be arranged so as to make one order. "No. 1 to operator A. Hold No. 1 for No. 2." "No. 2 conductor and engineer. No. 2 run to "A," regardless of No. 1." I should give the order in the following manner: "A" copy. "B" copy. To conductor and engineer No. 1, "A," and conductor and engineer No. 2, "B." No. 2 runs to "A," regardless of No. 1.

There both trains would know what to do, and it would answer all the same purpose as the order to "operator." The Western Division of the Pittsburg, Fort Wayne and Chicago run trains in that way, and it works admirably there.

Very respectfully, "H."

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AN AMERICAN OPERATOR IN ENGLAND.

NEW YORK, January 27th, 1872.

To the Editor of the Journal of the Telegraph.

DEAR SIR,—I have received a letter from Mr. Thomas Carter, a gentleman well known to most American telegraphers, who left here last spring to visit his friends in England. He is now working in the Sheffield Telegraph Office. His letter contains some very interesting information relative to the English telegraphs under Government management, and believing that your readers desire all the reliable information on that subject that can be had, I now request you to allow me to lay before them, through your columns, some extracts from his letter. He writes under date of Sheffield, Yorkshire, Jan. 5th, 1872, as follows:

"Getting tired of doing nothing, I made application for a position as operator, through my friend the Manager of Sheffield office, and with the commendation I brought, and his influence combined, I was offered 25s. per week to commence with. (Unbounded generosity). I held out for 30s., but it was no go, and so, rather than do nothing all the winter, I accepted it, and began work last week. Of course, I felt rather clumsy at first, but after a day or two everything seemed to come natural again. There is no fast work needed here, and we are very easily worked, eight hours being a day's work all over the kingdom; overtime is paid for extra. I had to pass a medical examination, and make out and fill in a bushel basket full of papers—such a mess of red tape I never saw! The Government is certainly more liberal than the old companies were, and seem to be more careful of their clerks. In case of sickness we are supplied with a doctor free of charge, and no deductions are made from salaries for absence caused by illness. Each operator has a holiday of two weeks once a year, and all Sunday duty is paid for as overtime. I can make my salary average about 35s. per week, without hurting myself. This, of course, will seem small to you over there, but after all it will go as far as a good deal more in New York. * * * *

"You will be interested in hearing further about the telegraphers' strike; I was in Manchester at the time it occurred. It appears that ever since the transfer of the lines to the Government the operators have been promised, time after time, that a general revision of salaries should be made throughout the kingdom, and that the older clerks should be well looked after. This revision has been made in some places, but not in some of the larger cities, hence the dissatisfaction. An association was formed in Manchester, which spread to other towns where the same grievance existed.

"It flourished swimmingly for a time, but some member of the association disclosed the fact of its existence and its purposes to the officials, and they immediately discharged the leaders. This so incensed the operators that nothing but a strike would satisfy them, which they very foolishly did, they having no "circuit" in London, and having no chance of success as long as London remained loyal. It lasted only ten days, costing the Government thousands of pounds, and then the strikers began to weaken; all of them, with the exception of about thirty, are back at work; the remaining thirty can resume duty provided they will surrender the books and papers of the association, and this they refuse to do; they are being supported by subscriptions from all parts of the kingdom.

"The systems of working in use here are the Morse, the Wheatstone automatic, the Cooke and Wheatstone single needle, and the bell sounders. On the Morse circuits we use double currents on the "open circuit" plan; the key has about ⅛ of an inch play, and sending two or three messages with it tries one's arm. We use no sounders, all registers and paper; all the relays are of the "flower-pot" pattern. The Wheatstone automatic is the best and prettiest gotten-up instrument I have ever seen, and really does what they claim for it, 120 words a minute when pushed, but usually about eighty. I enclose specimens of the sending and receiving slips—that on the received slip was printed at the rate of 100 words per minute. The messages, previous to being sent, are punched on strips of paper, which the receiving operator runs through the sending apparatus, previously calling up the station or stations to whom it is addressed. The sender can regulate the speed of his instrument, and send fast or slow, according to the condition of the wire. On the needle and bell instruments the Morse code is used, a beat to the left representing a dot, one to the right representing a dash. The lines work splendidly, and they should do so, for they are so well built; crosses and grounds are unknown, unless something very serious happens to cause them.

"The climate is very depressing to me, after having been away so long—have had no winter here as yet—not seen a bit of snow. Small Pox is raging very badly nearly all over England; four cases in our office now.

"At this time of year things are very dull in England, and there's little or no excitement, the principal topics of conversation being the Tichborne case and the illness of the Prince. I spent a couple of days in London hearing the former. * * *

"Give my respects to all my old friends."

Here his letter ends, but he promises to write again soon, and communicate some more news. In case he does, I shall again trespass on your kindness to communicate it to your readers. C. S. H. S.

NEW PATENT MAGNETIC LOCK FOR SAFETY LAMPS.

On Wednesday, the monthly meeting of the Midland Institute of Engineers, which includes the whole of the mining engineers in Yorkshire and the greater part of Derbyshire, was held at the society's rooms, Barnsley, under the presidency of Mr. Hodgson, of West Yorkshire. There was a good attendance. A very able paper was read by Mr. Mills, of the firm of J. Mills & Sons of Newcastle-on-Tyne, on Craig & Bidder's Patent Magnetic Lock for Safety Lamps. In describing the Patent Magnetic Lock, which is in use at the Harecastle and Woodshults Colleries, Staffordshire, the writer showed that all previous inventions had hitherto failed in preventing the miners and other persons working in the colleries, from opening their lamps with forged keys and other implements. Referring to the numerous explosions which have occurred through the lamps being tampered with, the writer showed the great need for a lamp which could not be opened except by those in charge. He further explained that the lamps are self-locking, by being screwed round, and they cannot be opened except by the aid of a powerful magnet, which is kept in the possession of the lamp-keeper. The invention or principle can be applied to any kind of lamps in use, at a moderate cost; the invention not entailing more than about one shilling per lamp. The weight of the magnet used is about a quarter of a hundred weight; the cost with frame, being £4. 15s. 0d. The locking arrangement is very simple, and is inclosed within the lamp, which is more readily opened than those with the common lock. After some discussion, the paper was ordered to be printed by the society, together with the diagrams illustrating the locking of the lamps.

DESCRIPTION OF AN ELECTRIC TELEGRAPH.—A book with this title, which was first printed in 1823, has just been republished in London, by Sir Francis Ronalds. Before 1823, he sent intelligible messages through more than eight miles of wire, insulated and suspended in the air. If the experiments which he then made had been only suggestions, this would have been remarkable, but as the scheme was put into actual practice, it ought to connect his name with the history of the electric telegraph.

NOVEL DANGER SIGNALS.—Men are now engaged in erecting novel danger signals at every bridge and tunnel on the Hudson River Railroad, to warn brakemen, who are compelled at times to run along on the tops of trains, of their near approach to such dangerous places. A pole is erected by the side of the track, and an arm projects from it at the top, over the track. From this arm hangs a wire fringe, low enough to strike a brakeman on the front-piece of the cap or against the face, if he is standing up as the train passes. This perceptibly notifies him that he is only one hundred feet from the bridge or tunnel, and must lie down at once. The blow inflicted by the fringe is momentarily a stinging one, but produces no evil results.—*Syracuse Standard.*

ELECTRO-MAGNETIC WATCH-CLOCKS. — One of Hamblet's electro-magnetic watch-clocks has lately been placed in Bureau of Engraving and Printing at the Treasury Department at Washington; the Amoskeag Manufacturing Company at Manchester have a clock for ten watchmen; and the Manchester Printworks have one for eight watchmen. It is very interesting to watch the progress of the men, walking through the buildings, which can be easily done by observing the clock in the office. Clocks are now in process of construction for the Harmony Mills, at Cohoes, N. Y., for ten watchmen; the new offices of the Pennsylvania Central Railroad at Philadelphia, for three watchmen; and one for the House of Correction at South Boston, for four watchmen; besides many for single watchmen, at various places. These clocks are all to be set up under the personal direction of Mr. J. Hamblet, Jr., and are being made by E. Howard & Co., of Boston, Mass.

NEW USE FOR ELECTRICITY.—Electricity has achieved a new triumph. Already employed to restore vigor and nimbleness to the gouty limbs of decrepit *bons vivants*, the recent discoveries of Dr. Bernier, a French physician, show electricity to be an efficient remedy for the evil effects of excessive drinking on the human nose. The doctor maintains that, by the application of an electric current to noses even of the most Bacchanalian hue, the flesh may be made "to come again as the flesh of a little child;" and he supports his assertion by a case performed on a female patient of his own, a woman of high rank.

VANDERBILT wants to buy the Hoosac tunnel for a family vault. The Pennsylvania Railroad requires the Boston, Hartford and Erie road to supply Thomas Scott with wooden nutmegs and shoepeg oats for feeding his numerous State Legislatures. First-class in geography, stand up? What is the population of the United States? Answer: Five, viz., Thomas Scott, Cornelius Vanderbilt, Leland Stanford, Jay Gould, and William Orton.—*Chicago Tribune.*

THE SCHOOL FESTIVAL.—This beautiful little Quarterly Magazine, devoted to new and sparkling matter for *School Exhibitions* and public days, is received for January. No teacher or pupil should be without it. It costs only fifty cents a year; single copy, fifteen cents. Write for it, to ALFRED L. SEWELL, Publisher, Chicago, Ill. Send your subscriptions *now* and you will not regret it.

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SCIENTIFIC AND PRACTICAL INFORMATION.

THE EFFECT OF LIGHT ON SMALL POX PUSTULES.

Among the many investigations now being made of the chemical action of light, there are none more interesting or more important than those which are directed to the observation of its effects on the health. It has been observed by Dr. Weber that the sensibility of the skin is very much increased in those parts of the body which are always exposed to the light, and this difference has even been measured by that eminent physician. This remarkable fact is especially observable on persons suffering from small pox, the severity of the skin disease being visibly augmented if the patient be not confined in a dark room. Dr. Waters has recently published a paper on this subject, in which he states that if the room be so darkened that not a single ray can enter it, the effect is to arrest the disease at the papular or vesicular stage; it never becomes purulent, and the skin between the vesicles is never inflamed or swollen; *liquor sanguinis* is not changed into pus, nearly all the pain and itching are absent, and the smell is, if not entirely removed, greatly diminished. Another advantage, important in a therapeutical point of view, is the assistance given to medicines, the absence of light increasing the excretory powers of the skin.

TARIFF BOOKS.

ELGIN STATION, Feb. 7th, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR;—The Western Union Telegraph Company would, I think, confer a favor to all managers, and benefit themselves if they would cause to be issued quarterly, or oftener, a complete revised and corrected Tariff Book (got up similar to the Supplement, dated May, 1871,) complete in itself; all the operators agree that the present book and mode of corrections is a downright nuisance.

This week "Bobtown" is in square 100, next week it is in another, now its name is changed. All space is filled, and "interline," "scratch," rub out, &c., all this could be saved; all operators would rather pay one or two dollars per year to save this vexation, and how much would the Company save. They could well afford to furnish such a work free, or at a very small price. If the suggestion is good it is free.

D. N. T.

CHILLICOTHE, O., Jan. 29th, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—Will you please notify telegraph managers and superintendents, of an unprincipled telegrapher, by name, T. J. McSweeny, who is going the rounds, practising impositions upon companies where he is unknown. He has recommendations from good parties, but of an old date. If he, at any time, merited confidence, he has forfeited it. He formerly read law at Wooster, O. His "modus operandi" is to work for a few days, get possession of money enough to compensate services and suddenly depart, leaving all bills unpaid. His sojourn with this Company was one night received; and fearfully *bulled* one commercial message, struck out next day. In the course of a few days he was employed by the Western Union Company, Little Miami Railway Company, Ohio and Mississippi Company, Pittsburg, Cincinnati and St. Louis Railway Company, and this Company. When last heard from, he was "on the wing."

Very respectfully, J. N. MILLER,
Manager of Telegraph.

We publish the above because a responsible name is attached to it, but with no knowledge of the circumstances except as given.

VARIOUS THINGS.

To the Editor of the Journal of the Telegraph:

In reply to "Observer," I would say that the first great requisite in train dispatching, is to insure absolute safety. If the usual wire is taken up to the disadvantage of other business, an additional wire should be strung. This is the course adopted by the Railroad Company, by whom I am employed. It seems to me that "Observer's" plan can not work to advantage if safety is required.

I have a suggestion to offer, which is, that no man should be allowed to occupy the position of "train dispatcher" until he is thoroughly acquainted with every mile of the division over which he is to have charge—with its stations, bridges, and side tracks. He should, at least once in six months, pass over his division. I see the force of this suggestion every day in my own experience.

I fully concur in your interpretation of the rules in regard to "Red" messages. The rules are not understood by many. I once received a half rate message at 8 P. M., from an office in Missouri, with an urgent request to "deliver quick, and send answer to-night, if possible!"

Your decision (JOURNAL, Feb. 1st.) as to postscripts after signature, is not only correct, but timely. These postscripts are getting to be a nuisance; while there is not only no rule for it, but no reason for such a rule.

What is the matter with the "Supply Department?" My requisition sent October 1st, 1871, was not answered; and I still wait response to requisition of January 1st, 1872. I am west of Chicago.

We need more instruction in regard to batteries. In the ordinary Daniell battery, (local) should the sulphate of copper be suspended near the surface in a pocket—so-called—or placed at bottom of jar? Some locals have a glass jar. Some locals have a glass jar—half gallon capacity—and small strip of copper; others have earthen jars, two gallons capacity, and strip of copper, six by nine inches, both Daniell's; which is best? and is the large copper necessary? Yours, truly, MANAGER.

ANSWER—The sulphate should be placed in the pocket. Its action from thence is more likely to be equalized as it dissolves. When placed at the bottom the action is apt to be confined to the lower parts, leaving the upper weak. We incline to think, that where the zinc is large and copper small, with plentiful liquid, the battery is most constant and economic. THOS. JONES.

MONMOUTH, ILL.

THE cable for the South Pacific, manufactured in 1870, has not been laid, waiting quietly for the completion of the West India cables.

KANSAS BULLS.

January 26, 1872.

To the Editor of the Journal of the Telegraph:

Mr. Wayne Parsons, formerly of our Utica, N. Y., office, now working on the Kansas R. R. wires, sends annexed samples of "bulls" recently made "Out West." The "bulls" are genuine; and one—the substitution of 100 for *well* after words "one hundred" as if 'twere figure-duplication—is unique.

Respectfully, DOLAN, N. Y. Office.

1.	*Original.* "Meet her; send us one hundred: well"	7 paid.
	As received. "*Mother*; send us one hundred. (100).	7 paid.
2.	*Original.* "Mary's sick; come home quick."	
	As received. "Mary's *sock; cog log juice.*" *	

* Sending operator missread word.

A SCRAP OF HISTORY.

Interview in BERLIN, Feb., 1868, of Prof. MORSE with Baron Phillipsborn, Director General of Telegraphs.

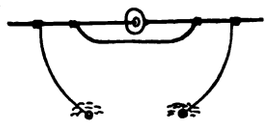
"Professor Morse was in town last week. During his stay he called upon Colonel Von Chauvin, Superintendent of the Bund Telegraphic System, to make sundry inquiries. After answering his questions, Colonel Von C. said that the operators had heard of his presence and would be delighted to see him. Mr. Morse assented to the presentation, and was thereupon shown into the large operating room; at a word from Colonel Von C. the occupants rose up and stood *a la militaire*. 'You have the honor to see before you, gentlemen, the Father of the telegraph said the Superintendent. All bowed and bowed again, till, as a friend says, who relates the incident, the fond parent seemed quite embarrassed in the presence of so much of his children. Herr Von Phillipsborn did not wait for him to be shown in, but on receiving his card, came out of the ante-chamber to meet him; then taking both his hands in his own he asked whether he really had the honor of speaking to Mr. Morse, or, as he said, "Mr. Morzey." There was a conference in session on a new postal telegraph treaty with Belgium, and he therefore begged Mr. Morse to allow himself to be presented to the Belgian Minister, the Belgian Postmaster-General, &c., &c. The formal introduction was prefaced and supplemented by a speech from Director Von P., in which he thanked Mr. Morse, in the name of his government, of Prussia, and of all Germany, for his great services. All of the gentlemens hook hands with Mr. Morse in turn, each paying him some fresh compliment—the Belgian Minister speaking French. To the second speech of the Prussian Director Mr. Morse replied: 'For the flattering reception which you have given me, gentlemen, I am very grateful, and I thank you for the complimentary way in which you have been pleased to speak of my services. It is very gratifying to me to hear you say that the telegraph has been and is a means of promoting peace among men. Believe me, gentlemen, my remaining days shall be devoted to furthering this great object.' After a repetition of the handshaking, Her Von Phillipsborn led his guest into a small cosily furnished room, saying as they entered, 'I have so very often thought of you, Mr. Morse, but I never thought I should have the honor of receiving you here. We are all so much indebted to you—Prussia is so much indebted to you. Here you can see how invaluable the telegraph was in the war of 1866. Here,' placing the forefinger of his right hand on a large telegraph map—'here the Crown Prince came down through Silesia. This is the line of march,' indicating it with the other forefinger, 'of Prince Frederick Charles. From this station the Crown Prince telegraphed Prince Frederick Charles, always *over* Berlin, 'Where are you?' The answer reached him also over Berlin. The Austrians were here,' said he, placing the right thumb on the map between the two fingers. 'The next day Prince Frederick Charles comes here,' the left forefinger joined the thumb, 'and telegraphs the fact, always *over* Berlin, to the Crown Prince, who hurries forward here.' The forefinger of the right hand slipped under the thumb, as if to pinch something, and the director looked up. Perhaps he thought of the July afternoon when sitting listening at his little mahogany-tapped table, over which had passed so many important messages; he learned that the cousins had joined at Konigsgratz, a junction that decided the fate of Germany and made Prussia what she now is, a junction which without the telegraph, 'always *over* Berlin,' would have been impossible.

McL."

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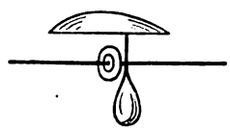
FAMILIAR TELEGRAPH TALKS.

Our last talk has brought us an enquiry, which being very simple, is easy of illustration and reply. It is related, however, to a large family of household troubles which it is about time were being remedied and got rid of. In the case presented, the wire of a certain railroad telegraph passed in front of a station, a glass knob inserted in the usual way, and wires led from either side to the station. The point of inserting these wires into the station was considerably lower than the main wire, and the wires were passed through the woodwork and united inside, the office having not yet been opened for business. Snow meantime fell and collected on each of the entering wires at the point of entry. Then came a partial thaw. Then appeared a heavy escape which was finally traced to the station described. We should have stated that the precaution had been taken to connect the main wire over the glass knob by a connecting wire. Query. Why should there be escape at such a point under such circumstances?



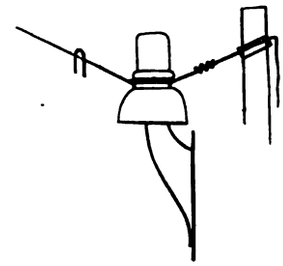
There is only one solution to this, and that is, that the melted snow must have traced its way down the wooden side of the station to the ground, thus leading off the current. The cut-off wire had no power to prevent this. Even had there been no snow, the damp air might have so entered the wood of the building as to have given an avenue of escape. We have stood sometimes inside of an office and received a shock from its damp walls where the main wire was suspended naked on nails and was then led to the operating table. Experience teaches that too much care cannot be exercised in providing against escape at the entrance to offices. Wires entered through the bare wood should never be allowed, unless the orifice be large and the wire made to pass through in the middle without contact to a rest inside, either on a level or sloping upward, and so protected that no snow can fill it. And yet this has been a most common fault, and, for all we know, may still be.

Let us resume where we left off in our last paper. We advised a cover to be made for the knob when wires were led to an office in that way. Here is a simple design for this. Any ingenious operator can make and apply it. Although apparently a small thing, it will pay to do it. It is a point in a young operator's favor when done.



Even with this precaution at the knob, a like care should be observed at the entrance. If the wires be copper which lead from the main wire to the window, see that the connection be thoroughly made and soldered. Insist on this. If you do not, rust will in time supervene and the chemical action which a little moisture will start between the copper and iron or zinced surface of the iron wire will soon corrode both, and your connection will deteriorate and perhaps be destroyed. Even where the connecting wire is iron the joint should be soldered, there being no pull upon it as in the main wire joints.

In reference to the entrance of the wire at an office, inasmuch as the wire usually inclines downward from the main line, it is necessary to have a bracket and insulator close to the point of entrance, and the wire from the insulator to the entrance sloping up. A simple and useful device is to bind a bit of wire on the main wire three or four inches from the insulator, so that the rain drops will fall before coming to the insulator. All these apparently minor devices



are useful, and an operator will be repaid by the care thus taken. We would slope the hole where entrance is made, inserting a piece of glass tube, so as to give every point a chance to be dry. And if the window is exposed, should a small roof be arranged to cover the brackets and the portion of the window where the wires enter, it will indicate that a wise and careful man is at work within. We believe that the bad working of many a line is caused by neglect of these little details.

Were we to express a preference for the point of connection with the office covered wires, it would be at the point between the insulator and the window, and that it also be most carefully soldered. The wires having been thus entered, many will think all danger to be gone, and that there is now nothing to do but hitch on and go ahead. It is far otherwise. There is exposure at every point. First, there is the combined switch and lightning arrester. The wires are to be carefully stripped of their covering and entered at the binding screws. See before doing so that the end is thoroughly brightened, and then see that the screw is pressed well home. Let it alone thereafter. The wood plate of the switch is supposably of hard wood and dry. If not, it will cause trouble. It must be kept free from dust, for dust takes up the dampness sometimes found in an office, and, being lodged round the ground wire connection, helps an escape. From the cut-out, one well-covered wire should be led unbroken to the back end of the key, the other to the relay, and for a way office, a third wire from the relay to the key. No joints should be allowed.

We ought to say here that we are very suspicious of pine operating tables, especially when thick. Sometimes the centre retains its natural sap, or retains absorbed moisture for a long time. Over and over again have we found messages being received on open keys where such tables were in use, the current passing through the moist centre of the table across from the fastening screws of the key. Once we covered a plain table at Pontotoc, Mississippi, with nice black glazed cloth, such as is used for table covers. We had to return two hundred miles to cut it out round the key. The current, much to our amazement, had established itself through the cloth, so subtle is it, and so carefully has it to be kept in its proper place. It is seeking constantly for short cuts. For this reason we prefer that the key base be screwed to the table, and the connecting rods with the binding ends be passed through without touching the table. This may be a refinement of care. Call it so, but you have a wide-awake thing to care for. No weasel was ever half so wide awake, and your care must be equal to it. We will endeavor in our next number to have a talk on the local battery respecting which so much has been said and written. We will be as thorough as possible.

CALLAUD BATTERY.

NEW YORK CITY.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—Will you please inform me in the next issue of your valuable paper, if you have space, how long it takes the Callaud Battery to be strong enough to operate a register, distinctly? And could not the process be shortened by using a solution of sulphate of zinc, instead of waiting for the zinc solution to become the proper strength, by generation? Yours very truly, OPERATOR.

Our battery keeper says: It takes forty-eight hours to be in condition for work, and which may be shortened by warmth. We believe it is better to wait for the natural attainment of strength than to secure it quicker by the use of sulphate of zinc.

OUR MAIN BATTERIES.

To the Editor of the Journal of the Telegraph:

I presume that nearly all concerned are aware of the following facts:

As a general practice, our main batteries (if any) are cleaned and filled with fresh material once a week, and the nitric acid changed once besides—the latter called "renewing." Observe:

On Monday morning we will suppose it is cleaned; it is then at its maximum strength. On Thursday morning the nitric acid is taken out, and fresh put in. On the following Monday morning, when the battery is at its weakest stage, a half, one-third, or a quarter is taken down to be cleaned, often leaving the wires to work on less than one-tenth the strength of current which they will have after the operation of cleaning and filling is completed.

Almost the same can be said of Thursday morning. Work on the wires is, in many instances, frequently quite or nearly suspended, especially if the "cleaning" or "renewing" happen in wet weather.

There is no time when a main battery can safely be much reduced; yet the current from the various main batteries (during business hours, too), often fluctuate from 100° (maximum) to 10° in strength. There is no economy in this; hundreds of relays are thrown out of adjustment by the change of a main battery or two—more or less confusion and delays always ensue. This state of things does not apply here especially. I have observed it for years, from the Atlantic to the Mississippi.

A remedy will cost nothing, so to speak. A better one than this may be found. I would suggest mine, hoping to call out a superior one. Thus: that a reserve of one-fourth the working number of cups be kept, placed and ready to fill, the battery stand to have the additional accommodation provided for the reserve in all cases. Now, a 60 cup battery would be kept this way: starting all clean and fresh liquids Monday morning; on Tuesday add the reserve 15, and take out 15; make ready the reserve, and on Wednesday fill and add the reserve, and take out the second 15; on Thursday take out the 3d, and on Friday the 4th 15. Now we have fairly started, and from this out there need be but little variation. The battery will be constantly ¼ new, ¼ one day old, ¼ two days old, ¼ three days old, or thereabouts.

Please comment on this. * * *

A CALIFORNIAN combats sleeplessness in a novel way. He recommends that the feet be drawn up so that the tips of fingers may touch the toes. This establishes an electric current, and sleep soon intervenes. In case the experiment should prove monotonous, we recommend that the fingers be made to drum on the toes. This opening and closing of circuit ought to produce a not disagreeable tickling sensation, in itself an aid to sleep.

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RIGHTS OF OFFICES—RULE No. 20.

RALEIGH, N. C., January 30, 1871.

To the Editor of the Journal of the Telegraph:

There exists to some extent in this locality some difference of opinion relative to the discretionary power of operators, and as the organ of our Company, I would be pleased to have you settle this question through the columns of your valuable paper, and give us the true meaning of Book Rule No. 20. Suppose, for instance, a relay office, as this is, should receive a message destined for any point west of me in North Carolina, reading thus:

"To John Jones: Please send me scrap iron in car-load quantities; all over-charges will be paid." In sending this message to destination the check is challenged; matter is then referred by me (the relay office) to office where message originated. I receive in reply, "over-charges and car-load are counted as one word each." In face of such information direct from office where message originated, may I ask you to decide by what rule can the office at destination delegate to himself the right to stubbornly refuse to receive the message from me (a relay office) on account of not having a check made according to his own idea and opinion.

Please give this space in your next issue, accompanied by your reply and settle this vexed question.

ONE IN SEARCH OF RIGHT.

The Company's rule on this subject is one of the clearest of them all. The originating office has absolute authority in deciding the check and counting of words. No office has a right to detain any message on account of any mistake made in interpreting what constitute words, certainly not when informed that they were so interpreted. The stubbornness is specially objectionable, although an excellent quality when in the right.

WE neglected in our last to draw attention to the advertisement of M. A. Buell, Cleveland, O., one of the conscientious and painstaking manufacturers of telegraphic machinery, of which we have now so many. Mr. Buell makes to order all kinds of batteries, magnets, insulated wire, helicas, galvanometers, electric alarm apparatus and hotel annunciators, is reasonable in his charges, and thorough in his work.

The following is one of many testimonials sent him.

MACKINAW, January 15, 1872.

MR. M. A. BUELL, *Cleveland.*

DEAR SIR:—"The little monitor" came to hand this P.M Am well pleased with it. Think it is quite an ingenious piece of mechanism. The magnets are very strong; my battery (local) was weak when I put it in this afternoon, but it makes as strong a stroke as the old sounder with twice as much strength of local. This is a good point. Think an extensive sale awaits it. W. L. ATON.

THE Paris *Figaro* gives the following method of obtaining light instantaneously, without the use of matches and without danger of setting things on fire: Take an oblong vial of the whitest and clearest glass, put in it a piece of phosphorous about the size of a pea, upon which pour some olive oil, heated to the boiling point, filling the vial about one-third full, and then seal the vial hermetically. To use it remove the cork and allow the air to enter the vial, and then recork it. The whole empty space in the bottle will then become luminous, and the light obtained will be equal to that of a lamp. As soon as the light grows weak its power can be increased by opening the vial and allowing a fresh supply of air to enter. In winter it is sometimes necessary to heat the vial between the hands to increase the fluidity of the oil. Thus prepared the vial may be used for six months. This contrivance is now used by the watchmen of Paris in all magazines where explosive or inflammable materials are stored.

TESTIMONIAL TO SUPERINTENDENT F. H. LAMB.

VICTORIA, British Columbia, Dec. 21, 1871.

DEAR SIR:—The following letters will explain themselves:

MATSQUI, BRITISH COLUMBIA,
Telegraph Station, Dec. 1st, 1871.

To. F. H. Lamb, Esq., Dtstrict Supt. W. U. Tel. Co., and Ex. Supt. B. C. Telegraph Line.

SIR:—We, the undersigned operators of the British Columbia Telegraph Line, beg to express our sincere regret at your resignation of the Superintendency of This Line, and to offer this cane as a token of esteem, which please accept with our best wishes for your future happiness and prosperity. Signed,

Sarah A. Maclure, Geo. B. Murray, C. M. Chambers, John McCutcheon, J. G. Wirth, John Nicholles, T. R. Buie, John Murray, J. H. Carmichael, M. Ross, Henry Yeates, Alex. Lindsay, Jas. R. Leighton.

TO WHICH MR. LAMB RESPONDED AS FOLLOWS:

VICTORIA, Dec. 20th, 1871.

Dear Friends:

I was most agreeably surprised when Miss Maclure presented me in your names with your address and beautiful gift. I had not anticipated anything of this sort, and nothing was needed to keep in my mind a pleasant recollection of the operators of British Columbia. I thank you sincerely for this valuable cane, and assure that I shall always prize it highly as an expression of your good will and esteem, as well as a reminder of the pleasant associations with which I shall always connect it. With many thanks for your kind wishes for my welfare, believe me sincerely your friend, F. H. LAMB.

To Miss Sarah A. Maclure, Messrs. Murray, Ross, Chambers, Buie, McCutcheon, Leighton and others.

The cane is gold headed, rosewood, handsomely finished, with the inscription on the head, "To F. H. Lamb, Supt., presented as a token of esteem by the Operators of the B. C. Telegraph Line."

"VICTORIA."

THE Western Union Telegraph Company has been greatly favored in Johnstown by having in their employ a lady of the greatest accomplishments, both as a telegraphist and as a citizen, and, in return, they have manifested their gratitude in providing an office for her that cannot be excelled in neatness. Fourteen wires enter the office, and a switch-board register is put up, and desks, carpet, stove, railing, etc., etc., so that this estimable lady in charge has every comfort that heart could wish. We hope other lines will take the hint, and furnish their operators, at least, with reasonable comforts, and not work them fifteen hours per day. The Western Union line deserves the thanks of the people for their attention to their operators, and they may be glad that they have in their employ such an operator as Mrs. Ogle.

POST-OFFICE TELEGRAPHS.—Great efforts have been made to provide aid to the Postal Telegraph Department from the Royal Engineer Corps to help in meeting the difficulties caused by the strike of telegraph clerks. Yesterday a second detachment of men from the 4th Company at the School of Military Engineering at Chatham left head quarters for London, for service as telegraphists under the Post-master General. Other men are now being taught the use of the telegraphic instruments at the School, and when proficient they also will be sent to London. The party of Engineers who left Chatham for London on Friday, to act as telegraph clerks, after they had been joined by parties from Aldershot and Dover, were sent on to Dublin, to be employed in the Post Office there.

Amongst the new cables manufactured and laid during the year may be mentioned the cable in the Grecian Archipelago, in Grecian and Turkish waters, amounting altogether to 560 miles, connecting up the various isles, including Candia. These cables were manufactured and laid by the Telegraph Construction and Maintenance Company, who have the concession for the above places.

LIST OF GOVERNMENT DELEGATES AT THE INTERNATIONAL TELEGRAPHIC CONFERENCE, AT ROME, DECEMBER, 1871.

Austria and Hungary:—M. Brunner de Wattenwill, Aulic Counseller, Director General of Austrian Telegraphs. M. Edmond D'Ary, Counseller attached to the Ministry of Hungarian Commerce. M. Borowiczka, Secretar; to the Director General of Austrian Telegraphs.

Belgium:—M. Vinchent, Chief Engineer and Director of Telegraphs.

Denmark:—M. Martin Levy, State Counseller and Compartimental Director at the Ministry of Finances. M. Faber.

France:—M. Ailhaud, Inspector General of Telegraph Lines.

Germany:—Colonel Meydam, Director General attached to the German Telegraphs. M. Gumbart, Counseller at the General Direction of Communinations, and Director of the Bavarian Telegraphs. M. De Klein, Director of the Wurtemberg Telegraphs.

Great Britain:—M. Alan Chambre, representing the Post Office. Lieutenant Colonel Robinson and Major Bateman Champain, for the Government of India.

Greece:—M. Salachas, Secretary of the Greek Legation.

Holland:—M. Starin, attached to the Ministry of Finances, charged with the Direction of Telegraphs.

Italy:—M. E. d'Amico, Director General of Italian Telegraphs. The Chevalier E. Ponziovaglia, Chief of Division of Italian Telegraphs.

Japan:—M. Shioda, Secretary of the Japanese Legation.

Luxemberg:

Norway:—M. Nielsen, Director of Telegraphs.

Persia:—Major Bateman Champain, R. E.

Portugal:—M. Valentin Evaristo do Rego.

Russia:—M. le General de Luders, Private Counseller, and Director General of Telegraphs. M. Krapoukin, Court Counseller, Section Chief in the Telegraph Administration and Secretary of the Director of Russian Telegraphs.

Roumenia:—M. le General Prince Jean Ghika.

Servia:—M. Mladen Z. Radoycovitch, Secretary of the Direction of Posts and Telegraphs.

Spain:—His Excellency the Marquis de Mortemar, Envoy Extraordinary and Minister Plenipotentiary of H. M. the King of Spain to H. M. the King of Italy. M. Hippolyte Aranyo, Sub-Inspector of Telegraphs.

Sweeden:—M. P. Brandstrom, Director General of Telegraphs.

Switzerland:—M. Lendi, Director of Telegraphs. M. Louis Curchod.

Turkey:—M. Mehmed Izzet Effendi, Inspector General of Telegraphs. M. Yanco Effendi, Chief of Division to the Ministry of Posts and Telegraphs.

THE TELEGRAPH IN CHINA.

A scrap from the New York *Express*, while James Brooks, Esq., was in China.

"An event has just occurred which will hasten the erection of Telegraphs. The grand Pekin Council of Scholars have just awarded two competitive prizes to two Cantonese scholars, the highest honors of the empire. The news was sent from Shanghai by sea telegraph to Hong Kong, and reached Canton days before the news could come overland. The Cantonese were astounded, and discredited the intelligence until the long-looked-for Pekin *Official Gazette* came overland and confirmed it. Then there was wonder and marvel over that intelligence, and all China, from North to South, is asking if it will do to give foreigners the means of more rapid intercourse with the exterior of our empire than we ourselves have. Interest, their trade and commerce, I think, will soon dispose of that *Fung-Shuey*, and give China the Telegraph. 'The graves of our ancestors,' scattered over every little field in China, and will be more difficult and dangerous to be dealt with than this *Fung-Shuey*; but the 'graves of our ancestors' will have to go at last. All these opinions, even superstitious, in a *freeish* sort of country like this, have, however, to be respected, even by Emperors and mandarins. We have opened their great river, one of the greatest rivers in the world, and by steam we Americans do nearly all the coasting trade there, with Shanghai. Mandarins now prefer our boats to their junks to travel in. Europe and America have taught Chinamen how to cast cannon and to make rifles. Their factories, under our auspices, are almost equal to ours. Their rifle is as good as our Springfield rifle. Their ships of war are now putting on formidable fronts. If England again comes into conflict with China, it will not be so easy a conquest as in her two last Chinese wars."

WE have had the pleasure of a visit from Mr. A. M. Mackay the energetic superintendent of the lines of the New York, Newfoundland and London Telegraph Company. Mr. Mackay returned on the 29th to his home in St. Johns, Newfoundland. There is perhaps no territory in the world over which a telegraph is planted, so utterly wild and exposed. Yet there is none more uniformly in order, or whose business is transmitted with more regularity and despatch.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JAMES D. REID, Editor,
Executive Rooms, Western Union Tel. Co.,
145 Broadway, New York.

NEW YORK, FEBRUARY 15, 1872.

F. O. J. SMITH vs. PROF. MORSE.

There has recently appeared a communication from F. O. J. Smith, well known in the telegraph circles as the sharer of Prof. Morse in the fruits of his great invention, in which he, with characteristic malice, seeks to dim the laurels which the world, with common and warm consent have placed upon Prof. Morse's brow. It is a useless effort, especially when attempted by hands like his. It is worse than useless when the defaming paper is presented by one who has spent his strength in endeavoring to destroy what he could not rule, and in assailing and defaming those who served him best.

We deem it useless at this late day to enter any defence of Prof. Morse's claims to the honors which have been awarded him. The world, by a grand instinctive justice, aside from all the details of other men's merits, has made its selection and put the bays where they rightfully belong. Yet history will bear this record, that no man whom the general sentiment of society in all civilized nations have so marked as the subject of its honorable recognition, has more modestly accepted it, or been more outspoken in demanding that it be shared in the broadest manner by all who contributed to the grand end. Let all who have read the dedracting letter of Smith read the sublime speech of Morse at the Academy of Music. And let us perform one of our closing duties in placing on record a paper prepared for us by one of the acutest minds which ever held power in the Republic, now silent in the grave.

Prof. Morse's merits as an inventor have been severely criticized, and attempts have been made to confine them to very narrow limits. What they really are, is now pretty well established.

In 1819, Oersted discovered that a current of electricity, passing on a conductor, would deflect the magnetic needle when brought near it. This was the discovery of electro-magnetism.

In 1820, Schwieger conceived that if the current were made to pass many times around the needle by means of a coil of insulated wire, it would increase the force of the deflection. On trial the result was as he expected. This coil is called "Schwieger's Multiplier."

In 1825, Sturgeon conceived that if the electric current were sent through a wire coiled around a piece of iron, it would produce magnetism in the iron. He tried the experiment by insulating a round bar of iron, winding a naked wire spirally around it, and passing a current through the wire. The iron became magnetic. This was the invention of the electro-magnet.

About 1830, Prof. Henry conceived that if Schwieger's multiplier were applied to Sturgeon's electro-magnet, it would much increase its magnetic force. He wound insulated wire around the naked iron bar, making many turns, and, passing the current through it, found the result to be as he expected.

A variety of batteries had been invented.

One thing was yet wanting; that was, some means of renewing the magnetic force of the electric current before it becomes entirely exhausted by reason of the length of the circuit. That desideratum Prof. Morse supplied by his combined circuits. This, with his alphabet, and the new mechanism employed by him, constitutes Morse's invention; and these, in combination with the new result produced by him, are all he claims.

Truth is slowly making its way against error. Even the adversary counsel, in an argument before the Supreme Court of the United States, admitted that Prof. Morse was the first to invent "*a practically useful electro-magnetic marking telegraph.*" The world will not hesitate to believe that which interested counsel do not think it expedient to deny.

There is one main feature of his invention, however, which some men are still disposed to deny to him. It is the combined circuit. Their denial is based entirely on a misapprehension of some of Prof. Henry's statements, contained in sundry depositions. We deem it unnecessary to analyze those statements, because we have conclusive evidence, in a letter from Prof. Henry himself, that he knew nothing of that part of Morse's invention until more than two years after it was perfected. While Morse was in Europe in 1838-'39, Henry borrowed his wire of Dr. Gale, for the purpose of exp rimenting upon electro-magnetism at Princeton. On his return, Morse wrote to Henry, approving the loan of the wire, and, among other things, inquiring whether in his experiments he had become acquainted with any fact tending to show that his plan of an electro-magnetic telegraph was impracticable. To this Prof. Henry answered as follows, viz:

"PRINCETON, May 6, 1839.

DEAR SIR: Your favor of the 24th ult. came to Princeton during my absence, which will account for the long delay of my answer. I am pleased to learn that you fully sanction the loan which I obtained from Dr. Gale of your wire, and I shall be happy if any of the results are found to have a practical bearing on the electrical telegraph.

I am acquainted with no fact which would lead me to suppose that the project of the electric telegraph is impracticable. On the contrary, I believe that science is now ripe for the application, and that there are no difficulties in the way but such as ingenuity and enterprise may obviate. But what form of the apparatus, or what application of the power will prove best, can, I believe, be only determined by careful experiment. I can say, however, that, so far as I am acquainted with the minutiæ of your plan, I see no practical difficulty in the way of its application for comparatively short distance; but if the length of the wire between the stations be great, I think some other modification will be found necessary in order to develop a sufficient power at the further end of the line.

I shall, however, be happy to converse freely with you on these points when we meet. In the mean time, I remain, with much respect, Yours, &c.,

(Signed,) JOSEPH HENRY.

To Professor MORSE.

This letter establishes the following facts, viz.:

1. That Professor Henry had been experimenting upon electricity with Professor Morse's wire previously used by him in New York.

2. That, at the date of this letter, *upwards of eight years* after the publication of his experiments in *Silliman's Journal*, which have been largely quoted as virtually an invention of the electro magnetic telegraph, Prof. Henry had no definite idea of the form of such a telegraph, and supposed there were still difficulties which it would require "ingenuity and enterprise" to overcome.

3. That, although it has been confidently asserted that Prof. Henry's experiments, published in 1831, had shown how abundant magnetic force could be obtained on a circuit of any extent, Prof. Henry himself, *more than eight years thereafter*, deemed something more necessary for that purpose on circuits of great length.

4. That, supposing Prof. Morse's plan to be a telegraph of a single circuit, he deemed some modification of that plan necessary, when the circuit should be of great length, "in order to develope a sufficient power at the farther end of the line."

5. Prof. Henry did not then suggest, and the inference is irresistible that he had not before suggested, to Prof. Morse any specific modification calculated to effect that object.

Yet Prof. Morse, more than two years before, had not only devised, but actually constructed in his combined circuits, the "modification" Professor Henry, in May, 1839, thought still to be necessary, and in April, 1838, had embraced it in his specification then filed in the Patent Office.

Prof. Henry never claimed to have invented the telegraph or this part of it. He improved the electro-magnet, and thereby facilitated the invention. If his improvement were now used by an inventor in the construction of an electro-magnetic saw-mill, he would be just as much entitled to be considered the inventor of the saw-mill as he is now of the telegraph; and in that invention, Oersted, Schwieger, Sturgeon, and others would be entitled to an equal share.

We make this exposition, not to deprive Prof. Henry of a single laurel, but to put to rest the only remaining doubt as to the merits of Professor Morse as an inventor.

WITH the issue of March 1 we shall have completed five years of duty under the consolidated Western Union Telegraph Company, closing an entire telegraphic service of about twenty-seven years. It is with much feeling, and a big gulp of the heart, that we announce that, with that issue, our voice, as Editor of the JOURNAL OF THE TELEGRAPH, shall forever cease. A few words of farewell may appear in that number, and then we shall float away, as the dead float out on the currents of the deep dark rivers into the forgetfulness of the ocean. It is difficult thus to leave the family fire where we have been so happy. It comes very hard to shake hands which we may touch again on earth no more. But we shall lay down the pen glad in the consciousness of having done what we could, and in leaving the service in the esteem, we trust, of our associates in labor. We go to humor nature in her desire *for rest* to lengthen out, it may be, our lease of life by changing and limiting the nature of our engagements. We go with a profound conviction of the grandness of the service we leave behind us, and the multitude of generous men who remain to perform its duties. If our humble benediction on such be worth anything, it is most affectionately given.

THE Telegraph is a grave business, yet is not without its humorous side. For quiet genial mirthfulnes commend us to John Van Horn, the Southern General Superintendent. Here is his very latest utterance.

By some unaccountable telegraphing the following message was received at Washington, by the Railroad Superintendent, O. A. Stevens, who, for enlightenment, returned it to Supt. Van Horn, with the results following:

LYNCHBURG, Pa., Dec. 26, 1871.

O. A. Stevens, Gen. Supt. W. A. O. G. R. R. Co.:

General Superintendent Van Horn telegraphs that your list of Telegraph Franks for 1478 not to hand. If not forwarded, please send it soon. J. W. KATES, Supt.

MR. VAN HORN'S ENDORSEMENT.

Respectfully referred to Gen. T. T. Eckert, Gen'l Supt. W. Union Teleg. Co. I never asked for a list of Franks from this R. R. Co. in 1478. I was not in the Telegraph business at that time. I have traveled over the Georgetown road and know it is an old one; but I have grave doubts of its being in running order in the year mentioned. C. Columbus, an old friend of mine, came over this way fourteen years after the above date, but he never said anything to me about riding on that road. I think he went from Washington to Alexandria in a skiff. J. V. H.

WE return our sincere thanks to Mr. George Allen, Manager of the Western Union Telegraph Co's Office, Utica, N. Y., for a copy of Vail's pamphlet on the telegraph, from which we learned our first lesson in the mysterious art, and which to us at the time, was the most wondrous book of the century. Vast numbers of the pamphlet were sold at the time of its publication, and we poor pioneers had to depend somewhat for our daily bread on its sales, so we again thank Mr. Allen for the gift. It restores to us a friend of the good days when the people looked on a man who knew the telegraph as a minor Gabriel, not very minor either.

THE Western Union Telegraph Company have purchased the building on the south-west corner of Broadway and Dey street, and will proceed immediately to erect a building thereon suited to the growing necessities of the Company. It will probably take two years to complete such an edifice, but it will be worthy of the Company and the vast business which it is destined to do in the future, and for which the present premises, although spacious, are even now too limited for proper prosecution.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
February 15, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since February 1, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

426 Ashewa, Iowa.
210 Attica, Mich.
151 Bulger, Pa.
251 Climax, Mich.
410 Conway, Mo., re-opened.
200 Copac, Mich.
397 Comstock, Iowa.
210 Davison, Mich.
200 Emmet, Mich.
46 Florida, N. Y. Heretofore an Other Line Office.
210 Imlay City, Mich.
447 Hillsdale, Ks.
246 Kingston, Ga. Re-opened.
484 Keechie, Texas.
295 Letohatchie, Ala. Re-op'nd.
210 Lapeer, Mich.
154 Linwood, N. C.
83 Locke, N. Y. Re-opened.
336 Lafayette, Ill.
10 Lincoln, Me.
306 Milwaukee Stock Yards, Wis. Heretofore an Other Line office. Tariff same as Milwaukee, Wis.
406 Mason City, Iowa. Heretofore an Other Line office.
262 Milton, Ind. Re-opened.
307 Mich. Southern Crossing, Ill.
367 Onslow, Iowa.
321 Pocahontas, Tenn. Re-open'd
406 Plymouth, Cerro Gordo Co., Iowa. Heretofore an Other Line office.
* Palatka, Fla.
46 Pine Island, N. Y. Heretofore an Other Line office.
298 St. Ann, Ill.
47 Smithville, N. J.
337 Sherman, Ill.
8 Vanceboro, Me.
47 Whitings, N. J.
170 West Lafayette, O.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.	*Leaves this Line.*
Palatka, Fla.,	100 6	Lake City, Fla.

OFFICES CLOSED.

Athensville, Pa.; Cartersville, Ga.; Calhoun, Ga., Dalton, Ga.; Grays Ferry, Pa.; Jewett, Tex.; Kingsville, Ks.; Marietta, Ga.; New Memphis, Ill., and Ringgold, Ga.

Business for Grays Ferry, Pa., will hereafter be delivered from Philadelphia, Pa. Charges for delivery, 50 cents.

GENERAL INFORMATION.

Hereafter the "Tariff for Other Lines" from Chicago to the following offices will be as indicated below, instead of that published in Supplement to last JOURNAL:

Appleton,	Wis.....	60	4	Milton,	Wis.....	40	3
Arena,	"	60	4	Milton Junc.,	"	40	3
Beaver Dam,	"	50	3	Minn. Junc.,	"	50	3
Baraboo,	"	60	4	Monroe,	"	50	3
Berlin,	"	60	4	Nashotah,	"	35	2
Black Earth,	"	60	4	Neenah,	"	60	4
Brandon,	"	50	3	No. Prairie,	"	35	2
Broadhead,	"	40	3	Omro,	"	60	4
Brookfield,	"	35	2	Oregon,	"	40	3
Burnett,	"	50	3	Oshkosh,	"	60	4
Cambria,	"	50	3	Otsego,	"	50	3
Cedarburgh,	"	35	2	Ozaukee,	"	35	2
Chester,	"	50	3	Palmyra,	"	35	2
Columbus,	"	50	3	Pardeeville,	"	60	4
Cross Plains,	"	60	4	Pewaukee,	"	35	2
Deansville,	"	50	3	Plymouth,	"	50	3
Edgerton,	"	40	3	Randolph,	"	50	3
Elm Grove,	"	35	2	Ritchfield,	"	35	2
Evansville,	"	50	3	Rio,	"	60	4
Fall River,	"	50	3	Ripon,	"	60	4
Fond du Lac,	"	50	3	Rolling Prairie,	"	50	3
Ft. Atkinson,	"	40	3	Rubicon,	"	35	2
Fox Lake,	"	50	3	Rush Lake,	"	60	4
Granville,	"	35	2	Saukville,	"	35	2
Hanover,	"	40	3	Schleisingerville,	"	35	2
Hartford,	"	35	2	Sheboygan,	"	50	3
Hartland,	"	35	2	Spring Green,	"	60	4
Horicon,	"	50	3	Stoughton,	"	40	3
Iron Mountain,	"	35	2	Sun Prairie,	"	50	3
Iron Ridge,	"	35	2	Thiensville,	"	35	2
Jefferson,	"	50	3	Two Rivers,	"	60	4
Juda,	"	40	3	Waterloo,	"	50	3
Juneau,	"	50	3	Watertown,	"	35	2
Kilbourn City,	"	60	4	Waukau,	"	60	4
Lodi,	"	60	4	Waukesha,	"	35	2
Lowell,	"	50	3	Waumakee,	"	60	4
Madison,	"	50	3	Waupun,	"	50	3
Manitowoc,	"	60	4	Whitewater,	"	35	2
Mazomanie,	"	60	4	Winneconne,	"	60	4
McFarland,	"	40	3	Woodland,	"	35	2
Merrimac,	"	60	4	Wyocena,	"	60	4
Middleton,	"	60	4				

The name of the office heretofore known as Midland, Wis., has been changed to Pardeeville, Wis.

Hereafter the "Tariff for Other Lines" to Pine Valley, N. Y., will be the same as to Havana, N. Y.

The office at 387 Oxford, Iowa, is in Johnson Co.

In list of new offices published in last JOURNAL, Manica, Ill., should read Monica; Tampica Ill., should read Tampico; and 336, Lombard, Mass., should read 336, Lombardville, Ill.

n list of N. W. Co.'s offices, in Supplement to last JOURNAL, Beloit, Wis., should have been omitted; it is a W. U. office, sq. 316.

"Half-rate" messages will hereafter be taken for, and received from, Tracey City and Sewanee, Tenn.

OFFICES HAVING "SPECIAL SHEET A"

Will hereafter check Jeffersonville, Ind., same as "special rate" to Louisville, Ky.

WILLIAM ORTON, President.

COMPLIMENTARY.

On the 15th instant a complimentary dinner will be given to our friend L. G. Tillotson, Esq., at the St. Nicholas Hotel, prior to his departure on the 17th for the Continent. We know none more worthy of such a compliment, or an occasion on which we would more gladly be present in response to an invitation with which we were honored, but which we are unable to accept. Mr. Tillotson has a life-long record of industry and liberality which have secured him both friends and fortune. We trust his trip to the old world may prove a delightful relaxation from the cares of business, and be fruitful of thoroughly restored vigor and health, and where we hope soon to follow him.

While abroad, Mr. Tillotson will proceed with his family as far as Italy, and will visit all the factories both in England and the Continent where wire or railway and telegraphic machinery are manufactured. He will thus unite business with pleasure, and will return in the close of the Summer ready for an enlarged provision of every article connected with the trade. May favoring gales "waft him o'er the deep," and if the Alabama question is still unsettled when he reaches these noisy "Britishers," we hope he will give them an excursion and settle the whole business in his own peculiar way. Good bye.

THE Cable to Porto Rico has been restored, and communication will soon be established with the W. I. Islands.

A good deal of excitement has ceen caused by the publication of the following letter:

"Anglo-American Telegraph Company (Limited).
"26 Old Broad Street, London, E. C., Jan. 10.

"SIR—The attention of the directors having been called to certain rumours affecting the condition of this company's cables, they consider it their duty to inform their shareholders that, according to the results of the tests reported by the company's superintendents at Valentia and Heart's Content, the insulation of the cables, both of 1865 and 1866, shows a considerable decrease. It is proper, however, to add that this decrease of insulation does not at present interfere with the regular and rapid transmission of messages. With a view of ascertaining more accurately the exact condition of the company's cables, the directors have determined to send Mr. Willoughby Smith to Valentia, to supplement the tests made by the company's superintendents. I am, sir, &c.

JOHN GRANT, Secretary.

Since the issue of this disturbing letter, we learn that Mr. Smith has made his examinations, and that the loss of insulation has been found to be solely in the shore ends; the deep sea cables remaining as perfect as before.

To the Editor of the Journal of the Telegraph:

Will you please explain, through the TELEGRAPH JOURNAL, the meaning of "Additional to Assessment, Nos. 23 and 24?" By doing so you will oblige me as well as other operators on this line.

Very respectfully,
G. A. CARPENTER, Operator.

It simply means remittances received since the first acknowledgements went to the printer's hands. It saves the printer much labor. The assessment is the same.

THE INFLUENCE OF THE JOURNAL.

To the Editor of the Journal of the Telegraph:

When the JOURNAL was first issued it occurred to me that it would become a power for good in the profession in proportion as it awakened a spirit of inquiry among those with whom it came in contact. For some time that awakening seemed a doubtful matter, but I am glad to acknowledge that all doubt has passed away, since every issue of the JOURNAL carries with it the proof that the minds of many operators are aroused to the importance of seeking a fuller understanding of the business in which they are engaged. So far the JOURNAL has been a success. I was anxious also about the editor. *Who* was he? *What* was he? Was he a man of broad views and generous feelings—capable of appreciating the efforts of the humblest employee as well as the efforts of those in power? Had he a hobby to ride, and, if so, what? Was his education and experience such that we could safely go to him for such information as could not be well obtained from other sources? Well, all this has been settled; and I believe there is no manager in all the broad land who does not feel like striking hands with the editor with thanks for the past and hope for the future.

So much by way of comment. To my brother operatives I would say, the JOURNAL will be a success in our individual case only in proportion as we are benefitted by it; and also that its success—in a great measure—depends on us. It is our duty, and shall be a privilege, to communicate to the JOURNAL any new facts which comes to our knowledge, in regard to the actual working of the lines, care of batteries, &c., &c., and equall your duty to enquire of the JOURNAL in regard to those points on which we are ignorant. When we earnestly begin to do this, then will the JOURNAL become a teacher, and its power and influence be mightily increased.

We need not be afraid to expose our ignorance in regard to the mysteries of our profession—those who can claim to understand it thoroughly, are few in number—and we shall never truly begin to learn until we admit our need of more light. From my own knowledge I can say that there is a wide spread ignorance among operators in regard to many things whish they ought to know, and this is not confined to the younger hands. I have seen operators of ten years' experience who had no idea *why* a reply was necessary.

MANAGER.

A KIND WORD.

ST. JOHNS, N. B.

DEAR SIR: * * I cannot allow this opportunity to pass without adding some expression of my appreciation of the sterling value of the paper so ably conducted by you. The high moral tone and generous spirit which have ever characterized your editorials are not the least of its virtues. Believe me, fraternally,

F. W. JONES.

BORN.

To Mr. Mat Davin, Operator, Boston, Mass., at St. Pierre' Miquelon, on Friday, 2d, a daughter.

To Thomas J. Calahan, Chief Operator, Brokers' Branch Western Union Telegraph Company, Boston, Mass., on January, 24th, at Woburn, Mass., a daughter.

DIED.

FREEMAN.—In the 24th year of her age, at De Lassus, Mo., at thirty minutes past nine o'clock, Friday morning, January 19th, after an illness of three weeks, Emma Rosalie, beloved wife of William T. Freeman, and daughter of the late Dr Bourgeat, of Point Coupee, La.

New Orleans papers please copy.

KELLOGG—Died in Rochester, N. Y., February 3d, of consumption, Charles A. Kellogg, in the 25th year of his age.

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TELEGRAPHER'S MUTUAL LIFE INSURANCE ASSOCIATION.

RECEIPT ASSESSMENT NO. 25, TO FEBRUARY 13.

2	6	30	43	44	46	51	53	56	59	60	64
71	72	77	78	80	83	84	88	99	101	103	113
117	122	133	140	153	157	171	175	177	188	199	208
211	252	254	276	286	287	291	302	316	332	340	341
351	353	371	380	381	391	411	412	420	422	454	459
463	464	526	546	552	553	560	570	584	590	600	602
615	626	639	671	710	716	741	800	809	815	820	821
822	856	870	901	915	917	918	923	932	934	939	1001
1006	1008	1013	1014	1016	1019	1026	1029	1035	1043	1046	1053
1066	1084	1086	1087	1100	1101	1108	1116	1117	1118	1133	1134
1152	1154	1163	1175	1177	1178	1188	1199	1220	1247	1251	1255
1266	1298	1299	1306	1307	1308	1309	1310	1311	1312	1313	1314
1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1330	1332

CHARLES A. KELLOGG.

On Saturday last, while in Rochester, N. Y., we were informed of the illness of Mr. Charles A. Kellogg, late of Memphis, Tenn., and the announcement that his death might be hourly expected. He was appointed as a messenger in the Rochester office soon after we became superintendent of the lines in that region, and remember him as an active, willing, obliging boy. Learning to operate, he soon became skillful at the key, and has served the Western Union Telegraph Co. since then, at several prominent points, and always, so far as we know, acceptably. His last position was in Memphis, Tenn., where began the breach in his constitution which has now terminated in death. He died on Saturday night, February 3, at 9 P. M.

One unpleasant circumstance occurred to us in this case, which we must mention. Young Kellogg learned of our presence in Rochester, during Saturday, and desired to see us, repeating and urging this wish with much frequency. On hearing of it, we arranged to go an hour or two afterwards, and started for that purpose. Calling on our way at the Telegraph office we were told that we had better not go, as consciousness was gone. Against our judgment but obedient to the message, we refrained from our visit until the next day. We found the door bearing the insignia of death. Within lay our friend, cold, and sheeted for the grave. He had called for us until 6 P. M. the night before, the exact time when the message was given us which prevented our visit. After that he sank away, and, at nine, died. We could only look at the hollow wasted form from which life and speech had fled. We missed the opportunity of comforting him in his last hours. We hope he had a higher and holier voice than ours to cheer him as he entered his last rest. His widowed mother will receive the hundred dollars promised by the Western Union Telegraph Company, in addition to the fund from the Telegrapher's Mutual Life Insurance Association, of which he had been a member since an early period. It will be a practical sympathy deeply appreciated and worthily bestowed.

LETTER OF SYMPATHY FROM THE OPERATORS.

To Mr. and Mrs. Kellogg:

AFFLICTED FRIENDS:—Permit us to assure you of our sincere sympathy in the great affliction which has fallen upon you and us, but doubly severe upon you who loved Charley as an affectionate son, whose gentle heart was ever that of a child's. We loved him as a friend and companion, in whom we could confide and trust. He was eminently faithful and companionable. In his profession he was an ingenious expert, and a valuable servant to his employers and the public. We mourn with you and deeply feel his loss, although we question our right to regret that he is gone. Charley is now free from suffering, and, we hope, in the full enjoyment of perfect rest and peace from all pain. We belive that God is good, and doeth all things well. Please accept our sympathy, and allow us to be your friends as we were his.

Yours ever truly,

(*Signed*)

A. Cole Cheney,	Dan'l. T Hunt,
Geo. A. Redman,	W. C. Hadley,
Percy K. Jones,	John Raquet,
Horace W. Smith,	E. A. Hanvey,
Hugh P. Mulligan,	James C. Bryan,
Cornelius A. Wykhouse,	W. G. Carroll,
Seymour G. Dana.	Wm. D. Reed,
E. H. Graves.	Edward W. Gibson,
H. L. Gregg,	B. F. Blackall,
A. H. Inglee.	John F. Agne,
E. A. Maloney,	Geo. D. Butler.
Wm. F. Butler,	

ROCHESTER, N. Y., Office, Feb. 6, 1872.

Messrs. Reed, Gibson, Redman, Mulligan, Raquet and Agne acted as pall-bearers.

The funeral took place on Tuesday, February 26, and was largely attended.

RESPECTING THE BONUS.

February 8th, 1872.

ON THE LINE OF THE N. Y. C. AND H. R. R.,

J. D. READ ESQ., DEAR SIR:—Pres't Orton's letter of December 28, 1871 to you, says: "The Company will add to the payment made by the association, 100 dollars in each case of the death of a member of the association, who is *at the time in our employ.*"

This is well, but what will you do with several hundred of us who are denominated R. R. operators. We daily do all the business for the W. U. Teleg. Co. that is offered, but are *paid* and in the *direct* employ of the R. R. Co., and therefore, in case of our death, our heirs must be deprived of the benefits of this $100. Your humble subscriber is one of the *oldest* members of the association, and one of the *old guard*, who worked on the W. U. lines in the West, in the infancy of that company, when our eastern terminus was Buffalo. Many of our associations, best and truest men and women can be found on this and other railroads doing the business of the W. U. Teleg. Co. in connection with our other duties. I regret exceedingly being excluded in this manner, and I have no doubt many others feel as I do about this. It would not be a heavy tax on the Teleg. Co., should they include us, as we die hard. In fact should not be over anxious to die after the Company had spread its broad mantle of charity sufficiently to cover us all. We pay all assessments promptly and cheerfully, and feel that we are all brethren; and while laboring indirectly for the same great and generous company, pray that our cause may be considered and favorably passed upon, and in due time reported to us through the columns of the JOURNAL.

Very respectfully yours in haste,

HOLDER OF CERTIFICATE 735.

ANSWER.—We have authority for saying, that the hundred dollar blanket offered by Mr. Orton is wide enough to cover the holder of certificate No. 735, and all who, like him, labor in so direct connection with the Western Union Telegraph Co. It cannot properly cover members who serve other telegraph companies, who will no doubt make a similar provision to their operators when brought to their notice. No one should feel aggrieved because a company desires to benefit its own men by giving a hundred dollars to their widows at death, but should endeavor to have all companies act with like liberality.

HOW TO INCREASE THE MEMBERSHIP.

J. D. REID, *Esq:*

DEAR SIR:—Acting (by request of the members) as agent of T M. L. Association, I have caused the inclosed message to be sent to all telegraphers, with the hope that it may result in an increase of the membership. Would it not be well to state that I am prepared to furnish applications, &c., upon application. I have three applications to forward soon. Can a certificate be changed, as to the bestowal of the benefit money, for instance: suppose original made out to benefit a sister, and previous to death, a wife is taken; can the certificate be changed, by request of a member, from the sister to the wife?

Very respectfully,
D. C. HINSDALE, Supt's Clerk,
Sixth District C. D.

The heirs can be changed at any time, by written authority, and all who have neglected to name their heirs should do so without delay.

HOW TO DO IT.

INDIANAOPOLIS, Ind., Feb. 6, 1872.

All Telegraphers:

Your attention is called to the letter of President Orton, containing the resolutions of the Executive Committee of the W U. Telegraph Company, sustaining and offering aid to the Telegrapher's Mutual Life Insurance Association, in the JOURNAL of January first, 1872, also to articles found on pages 54 and 56, of the issue of February first. This Association numbers 1,375 members, seventy-five of which were added during the first three weeks of January. Acting for the Association in this district, I earnestly desire your hearty co-operation in making this Association a success, and hereby cordially invite you to become members of the Association, for which purpose, blank applications will be forwarded to you, upon application to the undersigned:—Supts of R. R. Telegraphs and Division Operators are requested to forward the above to every telegrapher on their lines.

Respectfully,
D. C. HINSDALE, Supt's Office.

A PROTEST.

NEW YORK, January 29, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—I desire to enter my protest against the proposed arrangement with the W. U. Telegraph Co., by which that Company shall become the custodian of the funds of the Telegrapher's Mutual Association and the virtual controller of its affairs, to the prejudice of members not in the employ of the former Company.

I would favor a small assessment for compensation to the officers of the Association, but can never sanction the transfer of its affairs to hands in which its usefulness is sure to become limited.

Respectfully,
W. H. MOAK, 433 Broadway.

REPLY.

We wish to assure every one that no one has the least control over the operators of the Association beyond its proper officers. We would as willingly deposit the money any where else on the same terms, if equally convenient and secure. The death bonus of one hundred dollars is a free gift and subordinates no one. We would be glad to see other companies do the like thing. The officers of the Western Union Co. have never intimated a desire or attempted in any way to limit the usefulness of the Association, or in any way discriminate in favor of its employees, except by providing this hundred dollars at death. Mr. Moak could scarcely ask them to extend this to those not in their employ. All funds are subject to the check of the Treasurer of the Association, and to his only.

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16,000 MILES

OF

"JOHNSON'S" WIRE

USED BY THE

TELEGRAPHS OF THE UNITED STATES

DURING THE YEAR 1871.

This is sufficient refutation of all the intimations thrown out by the Manufacturers and Importers of other Wires, reflecting upon the acknowledged superiority of the Wire manufactured by

Messrs. RICHARD JOHNSON & NEPHEW,

MANCHESTER, ENGLAND.

Their Works are the Largest in the World.

The great advantage which they possess over other manufacturers is their patent process of drawing Wire in great lengths (averaging 1,200 feet).

All Telegraphers know that, in nine cases out of ten, breaks in Wire occur at joints, hence the less joints the fewer breaks.

Messrs. RICHARD JOHNSON & NEPHEW furnish three-fourths of all the Telegraph Wire used by the

ENGLISH GOVERNMENT.

This Wire is necessarily subject to the tests, etc., imposed by the English Post-office Department.

A large stock always on hand and for sale at the lowest market prices—both free and in bond.

TELEGRAPH LINES

OF ANY LENGTH FULLY EQUIPPED WITH

Wire,
Insulators,
Batteries,
Instruments, &c.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET,

NEW YORK.

Sole Agents for "Johnson's" Wire.
" " " American Compound Wire.
" " " Cauvet's Patent Screw Insulator.
" " " Sam'l C. Bishop's Insulated Wires and Cables.
" " " Brooks' Patent Paraffin Insulators.

Manufacturers of every description of

TELEGRAPH APPARATUS.

CALLAUD BATTERY,

KEPT ON HAND,

AND

Orders filled by

H. R. DAVID,

17 Platt Street, New York,

W. MITCHELL McALLISTER,

728 Chestnut Street, Philadelphia,

AND BY

GRAY & BARTON,

Agents for the United States,

479 State St., Chicago, Ill.

ELECTRIC TELEGRAPH WORKS.

FLEMING, POTTER & CO.,

N.-W. Cor. SECOND & CHESTNUT STS., PHILADELPHIA,

MANUFACTURERS of every description of

TELEGRAPH INSTRUMENTS,

ELECTRICAL APPARATUS, and

RAILWAY SIGNALS, &c.

☞ Inventor's models carefully attended to. ☜

WILLIAM E. DAVIS,

Manufacturer and Dealer in

TELEGRAPH INSTRUMENTS,

319 Newark Avenue, Jersey City, N. J.

Now offers for sale, or will manufacture to order:

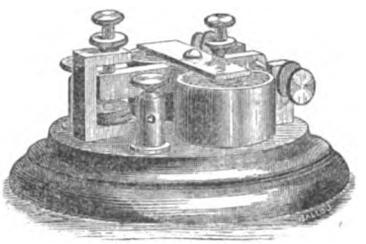
REGISTERS,
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INVENTORS' MODELS, &c.

☞ *Charges for workmanship moderate.* ☜

M. A. BUELL,

Manufacturer and Dealer in all kinds of

Telegraph Supplies.



A VERY FINE NEW STYLE

SMALL SOUNDERS,

Polished Rubber Covered Magnets, $6.00.

The same, on Mahogany Base and Silver Plated, . . . $9.00

Agent for

Pope's Nonpareil Apparatus,

AND

PUTT & CO.'S MECHANICAL INSTRUMENTS FOR LEARNERS.

Above Instruments kept constantly on hand at manufacturers' prices.

Materials for Private Telegraph Lines,

With instructions for putting up and operating.

M. A. BUELL,

26 Waring Block, Cleveland, Ohio.

AMERICAN FIRE ALARM

AND

POLICE TELEGRAPH.

GAMEWELL & CO., PROPRIETORS,

NO. 104 CENTRE STREET, NEW YORK.

J. W. STOVER,
General Agent and Superintendent.

L. B. FIRMAN, Chicago, Ill.,
General Agent for the West and North West.

J. R. DOWELL, Richmond, Va.,
Special Agent for Virginia and North Carolina.

J. A. BRENNER, Augusta, Ga.,
Special Agent for Georgia and South Carolina.

L. M. MONROE, New Canaan, Conn.,
Special Agent for New England.

This system of Fire Alarm and Police Telegraph, with a Central office, or upon the

AUTOMATIC PLAN,

is now in operation in the following cities, to which reference is made for evidence of its great SUPERIORITY, VALUE and UNIFORM reliability:

Albany, N. Y.,	New Orleans, La.,
Alleghany, Pa.,	New Haven, Conn.,
Boston, Mass.,	Newark, N. J.,
Buffalo, N. Y.,	Omaha, Neb.,
Baltimore, Md.,	Philadelphia, Pa.,
Chicago, Ill.,	Pittsburg, Pa.,
Cincinnati, Ohio,	Portland, Me.,
Columbus, Ohio,	Peoria, Ill.,
Cambridge, Mass.,	Providence, R. I.,
Charlestown, Mass.,	Quebec, L. C.,
Covington, Ky.,	Rochester, N. Y.,
Detroit, Mich.,	Richmond, Va.,
Dayton, Ohio,	ndianapolis, Ind.,
Elizabeth, N. J.,	t. Louis, Mo.,
Fall River, Mass.,	St. John, N. B.,
Fitchburg, Mass.,	Springfield, Mass.,
Hartford, Conn.,	San Francisco, Cal.,
Jersey City, N. J.,	Savannah, Ga.,
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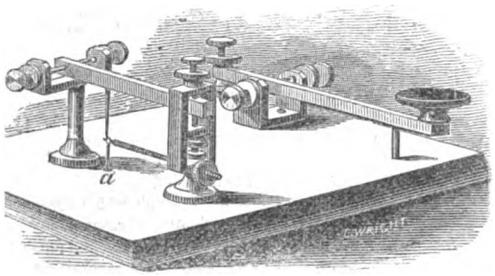
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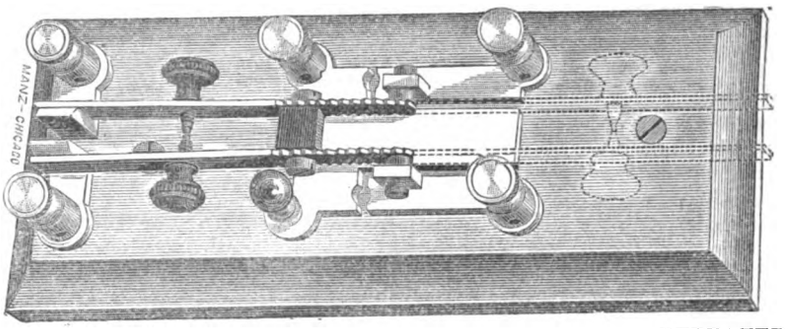
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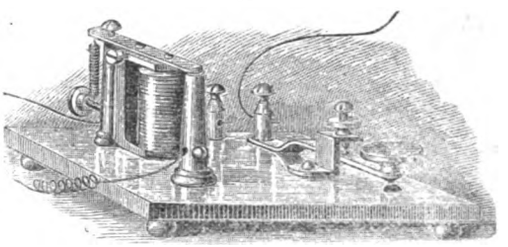
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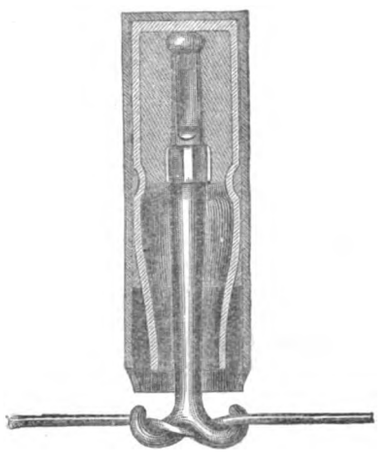
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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 7. NEW YORK, MARCH 1, 1872. WHOLE NO. 104.

PROFESSOR HENRY AND PROFESSOR MORSE.

LETTER OF PROF. L. D. GALE, OF WASHINGTON, D.C.

To Henry J. Rogers, Esq., Corresponding Sec'y, &c.:

DEAR SIR:—I have just read a letter from F. O. J. Smith, dated Dec. 11th, 1871, addressed to you, and designed to throw discredit on Morse's invention of the telegraph, the burden of which seems to be a rebuke to the designer of the monument, for elevating Morse to the apex of the monument, and claiming for Professor Henry, of the Smithsonian Institution, that high distinction.

The first question of an impartial inquirer is, to which of these gentlemen is the honor due? To ascertain this we will ask a second question. Was the subject of the invention a *Machine*, or was it a *New Fact in Science?* The former was Morse's, the latter was Henry's? The answer is, it was a *Machine.* Henry stated, that electric currents might be sent through long distances, applicable to telegraphic purposes. Morse took the facts as they then existed, invented a machine, harnessed the steed therein, and set the creature to work. There is honor due to Henry for his great discovery of the scientific principle, there is honor also due to Morse, for the invention of the ingenious machine which accomplishes the work.

Men of science regard the discovery of a *new fact* in *science* as a higher attainment than the application of it to useful purposes, while the world at large regard the *application* of the principle or fact in science to the useful arts, as of paramount importance. All honor to the discoverer of a new fact in science; equal honor to him who utilizes that fact for the benefit of mankind.

Has the world forgotten what Robert Fulton did for the navigation of waters by steamboats? It was he who first applied steam to propel a vessel, and navigated the Hudson for the first time with steam and paddle-wheels, and vessel, in 1807. Do we not honor him as the father of steamboats? Yet, Fulton did not invent steam, nor the steam-engine, nor paddle-wheels, nor the vessel; he merely adapted a steam-engine to a vessel armed with paddle-wheels. The *combination* was his invention. There is another example on record: Cyrus H. McCormick, the father of the reaping and mowing machine, took out a first successful patent, in 1837, and is justly acknowledged the world over, as the inventor of this great machine. Although 146 patents were granted in England previous to McCormick's time, they are but so many unsuccessful efforts to perfect a practical machine.

Yet, it is equally true that McCormick did not invent one original device used in his celebrated machine. The cutting apparatus, the device to raise and lower the cutters, the levers, the platform, the reel, the frame work, had all been used before McCormick's time.

But McCormick was the first genius able to put these separate devices together in a practicable, harmonious operation. The *combination was his* invention.

Morse did more, he invented the form of the various parts of his machine, as well as their combination. He was the first to put such a machine into practical operation, and for such a purpose. Who can question his title as the inventor of the telegraph?

Yours truly,

L. D. GALE.

Washington, D. C., Jan'y 12th, 1872.

INTERNATIONAL TELEGRAPH CONFERENCE.

SPEECH OF VISCOUNT VENOSTA.

The speech with which the International Telegraph Conference was opened in Rome, by Viscount Venosta, Minister of Foreign Affairs, was about as follows:

"At a not far remote period, politics was the exclusive employment of cabinets. Now, on the contrary, governments conceive it to be among their most earnest duties and cares, through their Minister of Foreign Affairs, and his agents, to watch over the development of commerce, and to make intercourse between nations easy, widespread, and quick. So it happens, that in addition to great political questions, which often enough yet engage the attention of statesmen, debates on much more peaceable but also of a more advantageous character take place on important subjects:—Postal facilities, Railroads, Telegraphs.

"Celebrated scientists, experts, and men of great executive ability have been called to the assistance of diplomats by profession, and this uniting of diplomacy with men who possess the priceless possessions of positive knowledge appears to me to be the introduction of one of the most fruitful innovations in the relations of nations towards each other. We can yet remember the time when each government thought itself to be in duty bound to strictly guard its boundaries against every new idea. Of all contrabands, that of ideas seemed to them the most dangerous. Now there are no more boundaries to thought; your Telegraph Lines encircle the earth in a net, whose meshes, becoming continually multiplied, represent in a certain measure, the nerve system of our planet.

"It is true, the Telegraph may be misused, it may serve the most reckless speculations; it is the most wonderful instrument for war, as for peace. This wonderful present to the omnipresence of human thought, does away in the most emphatic manner, with the causes of ignorance and error. The complete, continuous, instantaneous knowledge of men and things which are distant from us, prevents misunderstandings, and powerfully aids to the continuance of friendly relations among nations.

"In a certain degree united into a permanent association, you can, gentlemen, recommence the work anew in Rome, which you began in Paris, and continued with so much eclat and result in Vienna.

THE TELEGRAPHIC CONGRESS.

The telegraph conference which has lately concluded, was held for the purpose of the revision of the Convention of Vienna—a convention consisting of 67 articles concerning the international transmission of messages. It originated in Belgium, where a Conference was held at Brussels in 1858, and the original articles were drawn up, which were improved at a succeeding Conference held at Paris in 1865. It was then decided that Conferences should be held triennially at one of the European capitals. Vienna was chosen for 1868. It was there decided that the succeeding conference should be held at Florence, as the capital of Italy; but Rome having passed into the hands of the Italian Government, the Conference assembled there on the first of December last. All the European States, Luxembourg excepted, sent one or more delegates. Signor M. E. d'Amico, Deputy and Director-General of Italian Telegraphs, presided. The articles of the Convention are binding on all the contracting powers during the period between one meeting and the next, when any modification which may have suggested itself in the interval can be proposed. Any power not having joined the Convention can do so between the triennial meetings by accepting all the articles unconditionally. A claim put in by the great telegraph companies that they should be represented at the Conference, raised the question whether the Submarine Companies should be entitled to a *locus standi* outside the States from which they obtained their concessions.

As regards the great companies, after some discussion, the question being put to the vote, it was carried that the representatives should be admitted to the deliberations, but without the power of voting. The question of the neutrality of telegraphs in time of war was ably furthered by Mr. Cyrus Field, on the subject being drawn attention to by Mr. Neilson, of Norway. The President, however, having stated his opinion that the point could not be taken into consideration by the Conference, the subject was dropped. The resolution, however that—

"The Conference expresses the wish that the questions brought forward by Mr. Cyrus Field at the conclusion of his observations may attract the attention of the Governments," was passed.

Some interesting points with regard to the sending of messages in code, through the lines to India, were discussed. The principle of sending messages in code is that of making certain words represent complete sentences. By this method it is obvious that a message can be very much abbreviated, without at all obscuring the meaning to those who have the key to the code. The whole message is, in fact, a secret one, yet is so managed as to avoid being classified, and charged as such. The Indian delegates were desirous of charging these polysyllabic messages as messages sent in cipher. The majority of the delegates, however, were in favor of free trade, and insisted, not only that these messages should be charged as ordinary ones, but that messages sent in cipher should enjoy the same privileges. Major Champain

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ineffectually urged that this was in reality encouraging the sending of secret messages, which were infinitely more difficult to send than messages containing a positive meaning to the operator.

The chief subject brought to the notice of the Congress appears to have been that of the inconvenience caused by the competition between the Indo-European lines. From 1864 to 1870 the Turkish was the only line to India. The constant complaints of irregularity in the transmission of messages by this route led to the formation of the Indo-European Company's line, via Kertch and Teheran, and finally of the Red Sea line.

According to Article 13 of the Vienna Convention, each Government is to be the judge on behalf of the sender, of the route by which messages are to be sent. The Indian Government having this power, promised the Red Sea line an equal share of messages, provided the service was properly conducted. It is alleged, however, that when the Singapore line was completed, its directors combined with the Red Sea Company, in defiance of the Convention, and obtained for it the monopoly of the messages by printing on their forms "via Red Sea," and refused to send messages by any other route—the Red Sea having at the same time its share of the messages from the Indian Government, as agreed. To prevent this arrangement an amendment was carried to Article 13, allowing the sender to choose his own route, by writing the direction on the message.

NEW YORK STOCK REPORTING.

There are four (4) Morse operators employed at the Stock Exchange, known as Reporters, the duties of one being confined exclusively to the transaction made on the first and second calls, and on Government Bonds.

The duties of the other two are confined to the reporting of sales, bids, changing of quotations, &c., during the hours of the Board, and which are made outside of the two calls.

There are four (4) sets of instruments used, each set being simply a relay and key—one up stairs in what is known as the "Government Room," where all transactions in Government Bonds are made, and the other three in the "Long Room" down stairs, where transactions in every description of stocks are made, as well as of State Bonds and securities.

These four (4) instruments are connected by one circuit leading to the main office of the Gold and Stock Telegraph Company, 61 Broadway.

The instrument in the Government Room is in close proximity to the President's desk, where the reporter can see and hear all sales made, and which he transmits almost simultaneously with the announcement of the sale, in fact, almost before it has left the President or Vice-Presidents' lips.

The three (3) instruments in the "Long Room" (lower) are situated, one immediately in the rear, and on a level with the President's desk, this being used only for the transactions on call; the other two, are placed one each side of the room, one reporter remaining on each side, thus dividing the work, attending exclusively to certain stocks, and prevent the reporting the second time of the same sale or quotation, which would be the case, if they were to run from side to side, while both were on duty. The reporter mingles in with the "Pools" on his side, watching each one closely, keeping his eyes and ears open, and as soon as a sale is made, reports it at once to 61 Broadway by the stock wire. No sales of less than 100 shares of any stock is reported, unless by request, and that of a majority of the members present. The Reporters are constantly on their feet, the reporting done standing, no calling is necessary—the operator simply runs to the instrument and reports, for example, "W. U. 500, 70⅝; R. I. 200, 110¼. U. P. 100, 28—or quotations; W. U. 66½ @ ⅝ R. I. 110¼ @ ½; U. P. 27½ @ 28.

No response is necessary, unless the operator at 61 doubts the figures, and asks if correct, which is done in as few words as possible, thus giving the other reporter, and the one on call, no delay in reporting from his side, or the sales on call or Governments.

There is one Morse stock circuit from the Exchange to 61 Broadway, on which the four (4) instruments mentioned are in circuit.

At 61 Broadway, in an office which is inaccessible to any one with the exception of those connected with it, except through the rooms of the officers of the Company, an operator is constantly on hand during the session of the Board.

As each sale, bid, or change in quotations is announced, he immediately calls out, and at the same time writes down on a large form, which is renewed every day, the sale, bid or change in quotation, as he calls out each sale.

There is a printer who transmits it at once on a return wire back to the Exchange, where it is printed, and where it is open for inspection to all the members of the Board. By this means they are enabled to see if any mistake occurred in the reporting from the "Long Room."

At the same time that this is printed, the transmitter also communicates to the offices of several hundred subscribers of the Gold and Stock Telegraph Company, which of course appears printed; and every banker and broker is enabled to see how matters stand at the Board, without leaving his office, or sending to ascertain. These reports are also transmitted (printed) at the Commercial News Department at the same time, as well as at the Cotton and Produce Exchanges, also to various hotels, and most of the Banking houses. In fact, the printing instruments are found every where. These instruments are all connected by one circuit.

There is also another wire connecting these different places, as well as running into a number of banking establishments, 61 Broadway and the C. N. D.* giving all changes in gold by means of the indicator. This circuit runs from the "Gold Room" and is controlled by the secretary of the Gold Board, who personally transmits all changes by means of the magnetic indicator, thus securing to a certainty, official and correct changes in all gold operations. The services of this officer of the Gold Board have been secured by the Gold and Stock Telegraph Company to attend to this important duty.

From 61 Broadway to C. N. D., is a circuit known as the Stock wire, by which all operations of the Board are transmitted instantly. There are the two regular calls, 10:30 A. M. and 1 o'clock P. M., (1st and 2d call). State bonds twice a day; first and second call of Governments, and also what is known as street sales of Governments and stocks every half hour. These are immediately transmitted by the C. N. D., over thirteen (13) different circuits to every city in the United States and the Canadas, simultaneously, to the agents of the department, who immediately furnish to their subscribers, as well as transmit by the printers, where the company have introduced them.

The regular weekly Bank statement is transmitted every Saturday in the same manner. The C. N. D. also receive from London, Liverpool and Paris, three regular reports daily, with additional reports thereto, giving intermediate changes in the European Markets. The reports some days reach to the number of twelve (12) or fifteen (15) from the principal English markets, also two or more reports from Frankfort, and Antwerp, Bremen and Hamburg.

These reports are immediately placed in cypher and transmitted over the 13 different circuits from the C. N. D. for distribution to its subscribers in all parts of the United States and the Canadas.

In the transmission of all stocks, Governments, States, &c., from C. N. D., the gold quotations are given.

Running from the C. N. D. to the New York Cotton Exchange and the Produce Exchange are four circuits, two Morse, two printers. On these two Morse circuits are received the New York Cotton and Produce reports, some 30 or 40 of the former, and 25 or 30 of the latter. These reports are received in cypher, and are immediately forwarded by the C. N. D. over its 13 circuits, with no delay perceptible, the mere transfer from one instrument to another only being necessary.

The two printers are used in transmitting to the Cotton Exchange, and Produce Exchange, as well as to all subscribers in this city simultaneously, all the domestic Cotton and Produce Markets of the United States and Canadas, as well as those of London, Liverpool, Paris, Hamburg, Antwerp and Frankfort, and various other European markets. These reports are received in cipher, translated and transmitted over the printers.

At the Cotton and Produce Exchanges, two persons are employed at each, one as reporter, and one as operator, the reporter putting all in cipher before transmission. Besides transmitting to C. N. D., both these Exchanges can work direct with a number of prominent distant points.

* Commercial News Department, 145 Broadway, N. Y.

SIEMENS' DYNAMO-ELECTRIC LIGHT.

A series of experiments was made at Sheerness, with a view to ascertain the applicability of Siemens' Dynamo-electric light to torpedo services in time of war. The principle on which the apparatus is constructed is that of causing the rotation of an indication coil of a peculiar construction, known as Siemens' armature, between the poles of a soft-iron electro-magnet. The feeble permanent magnetism which the soft-iron core of the electro-magnet has imparted to it when the machine is first made, causes currents to be induced in the wire of the rotating armature; these currents are caused to pass through the wires of the electro-magnet, thus increasing its power, and consequently also increasing the amount of electricity set in motion. The strength of this current of electricity is proportional to the dynamical force employed to rotate the armature. The current thus induced is caused to pass into the coils of the electro-magnet of a second machine of similar construction to the first, but of larger dimensions; the armature of this second machine is driven by the same engine that drives the armature of the smaller one, and is caused to rotate about 800 times a minute. It is the electricity from this second machine that produces the electric light by its passage between carbon points. The light in the experiments made when reflected by a parabolic reflector was of the most brilliant description—in fact, it was sufficiently clear that no objects of any appreciable size, such for instance, as an enemy's boat engaged in interrupting communication with a line of torpedoes a night, could have approached within a mile or more of Sheerness, without being sufficiently conspicuous to be fired at, and consequently driven off. The idea of causing the return of the current upon itself in the machine, was, we believe, announced simultaneously by Sir Charles Wheatstone and Mr. Siemens

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A BRIBE—CASH IN ADVANCE.

GENERAL OFFICE OF THE
METROPOLITAN TELEGRAPH INSTITUTE,
No. 213 NORTH THIRD STREET,
Opposite Post Office,
ST. LOUIS, MO., Dec. 11th, 1871.

DR. SIR.—We have from time to time, say twice or thrice a month, a good, competent student, who can send and receive readily by sound thirty words per minute. They also understand R. R. business as we have them practice in an office on the St. L. & I. R. R. for some time before pronouncing them competent. They can easily take charge of a night office or small day office, and would work for $40 per month. We have such a one at present. If you would chose to give one of my pupils the preference whenever you should have a suitable opening, I would pay you (as a present which would be strictly private and confidential between ourselves) the sum of fifty dollars cash in advance. If you think it would be an object to you the matter can be easily arranged satisfactorily to yourself. Please give me an early reply.

Yours Respectfully,
P. MCEACHERN.

The above is a bona fide letter, the original of which we have before us. We had occasion to denounce a similar institution in Sandusky for like practices. What charges are made to permit fifty dollar bonuses we cannot imagine. It is a false and injurious system. An honorable institution cannot resort to it. We have never joined in the cry against telegraph colleges as such. They can instruct as perfectly as instruction is possible without actual employment on business lines. Some have done so well and thoroughly. By proper arrangements there is no reason why first class operators cannot be thus instructed. But this system of enticement, pledging an office to each student, and offering bribes for their employment, has made them all suspected, and caused many to suffer cruel disappointment.

THE TRANSANDINE TELEGRAPH.—A double line of telegraph is at present being constructed across the Andes. Thirty miles of this line, which will pass over the snow-covered cordilleras, will be constructed of two copper-sheathed cables. It is expected that the line will be completed early in the spring.

THE ATLANTIC TELEGRAPHS.—A memorial has been presented to the Prime Minister by the Council of the Society of Arts, urging the importance of the Government at once securing by purchase the ocean telegraph cables connected with England, and thus combining the external with the internal telegraph service under the management of the Post-office. The memorialists call attention to the expense and uncertainty connected with the present arrangements, and the need for a very wide extension of the submarine telegraphic system to our various colonies and naval stations. It is further pointed out that the delay in acquiring the internal telegraphs has added seriously to the cost of purchase, and that the great bulk of that purchase-money may be properly considered as a penalty for the Governmental neglect after the necessity of the measure had been demonstrated. The memorialists consequently urge the completion without delay of a proper external as well as internal system of public postal telegraphy by the compulsory purchase of all the existing submarine lines of cable, and consolidating the same with the general postal system of this country.

POST OFFICE TELEGRAPHS.—A publication, entitled "The Office Code Book," has just been printed for the Post Office authorities, for the guidance, in the first instance, of telegraph clerks; although probably the information contained in it will at an early date be printed for the use of the public. It contains a list of all the telegraphic stations in the United Kingdom, and of the railway stations at which telegrams are collected and delivered by the railway companies on behalf of the Post Office, as well as a statement of the hours during which telegraph offices are open for business. It gives, moreover, the names of certain money-order offices in the country not yet opened for telegraphic business, with the name in each of these, of the nearest telegraph office, and its distance from the money-order office. The post-office authorities have also prepared stamped postal telegraph cards, for public use. These cards will be issued on and after the 5th of February, at 1s. each, or in packets of 20 for £1; and it is believed, that in a number of cases they will be more convenient than the ordinary stamped message form. They are intended for the use of persons who cannot, or do not desire to send messages to the nearest telegraph office, but who may be content to deposit them where they will be carried free of expense, to an office from which they can be sent by wire. If deposited in a pillar-box, wall-box, or ordinary post-office letter-box, they will be carried to the telegraph office to which the letters posted in the box are sent, on the next clearance of the box. The 1s. stamp on these cards will cover the cost of transmission of a message of not more than twenty words, within the United Kingdom, Scilly, Orkney and Shetland Islands excepted—the Channel Islands and the Isle of Man, as well as of the delivery of the message by special foot messenger within a mile of the terminal telegraph office or within the boundary of the postal delivery of that office, even in cases where that limit exceeds one mile.

JAPAN.—It is announced that the land line of telegraphy between Yedo and the North will be commenced forthwith. There will be a cable laid across the Straits to Hakodadi; and it is believed that within the next fifteen months Hakodadi, Yedo, Yokohama, Kobe, and Nagasaki and several intermediate places will be in telegraphic communication.

BATTERIES.—The following are some recent determinations of the electro-motive force of batteries, by M. Beetz, obtained with great accuracy:—

Bunsen's element	1·779	volts
Grove's "	1·684	"
Lelanche's "	1·167	"
Daniell's standard	1·000	"

The following are the results obtained some time since by Mr. Latimer Clark:—

Daniell (standard)	1.079	volts
Daniell (telegraph)	0·978	
Lelanche "	1·481	"
Bumen "	1·888	"
Grove "	1·956	"

ACCORDING to advices from New York, the American Atlantic Telegraph Company will probably begin at an early day to lay a cable from the extremity of Long Island to a point on the English or Dutch coast. A proposition is also at present before the Legislature of California, to grant permission to a company to lay a cable from San Francisco to a port in China. The Georgia Legislature has also granted to certain persons, the privilege of laying a cable from that coast to a point in France; but as Congress has jurisdiction beyond low water mark, it is doubtful whether any advance can be made until the matter has been acted upon by Congress.—*Mechanics' Magazine.*

ELECTRO-AUTOMATIC APPARATUS.—The members of the telegraph staff, D. Enrique Iturriaga, and D. Vicente Villareal, have invented an electro-antomatic telegraph apparatus which, according to the opinion of competent persons who have seen it work in the central station, is destined to bring about a revolution in the telegraph world. The commission appointed by the Post and Telegraph Director-General for the examination of the said apparatus, have given an account highly gratifying to the inventors; the minister of that particular branch has been informed of the importance of the matter and also of the scanty resources of the telegraph clerks preventing them from carrying out their project. The minister, in consequence, have had the necessary means placed at their disposal, so that Spain may not lose the honor of having inaugurated a useful reform in the transmission of communications.

BATTERIES.—Some interesting experiments have been lately made by M. du Moncel on the relative size of elements in an ordinary battery. He experimented with two Bunsen cells of equal size, but the elements were arranged differently. In the one, the negative element consisted of two plates of carbon dipped into nitric acid in the cell itself. The zinc, or positive element, centimetres, well amalgamated, was placed in the porous vessel containing acidulated water. The second cell contained two plates of zinc and one of carbon, the liquids being in all respects similar. The surface immersed was as 1 to 2.43 in the two cases. The electro-motive force of the currents as obtained from a tangent galvanometer were relatively 84° 10′ and 78° 5′, the smaller surface giving the greater force. The consumption of zinc was 32 and 38 grammes. From this it would seem that there is a gain with a smaller positive element over a larger, and also when the same element is smaller than the negative. These results are borne out by previous experiments of MM. Ruhmkorff and Delaurier, the former finding that when the zinc of a bichromate of potash battery was immersed one-fifth of its height, the battery gave out during the six hours an intensity that agreed with the total immersion of the metal. The result of such experiments tends to prove the use of a small surface of zinc, and the consequent economy for telegraphic purposes. Lelanché cell, now so much in use for telegraphic purposes, exposes but a small amount of zinc, and its electro-motive force is considerable, being nearly 50 per cent. more than the ordinary Daniell.

ELECTRIC CURRENTS OBTAINED BY THE BENDING OF METALS.—P. Volpicelli.—Metals when being bent or twisted give rise to the development of an electric current, but copper exhibits this phenomenon in the highest degree. Lead, although not an elastic metal, also gives rise to the generation of an electric current, thus exhibiting an instance of the conversion of mechanical force into electricity; the electric currents thus produced are not perceptibly due to the development of heat due to the action of bending or twisting. When the bending is accompanied by the tearing asunder, or, rather, the distending, of the two ends of the metallic wire, a current is produced in an opposite direction from that obtained by putting the two ends nearer together; by increasing or decreasing the velocity of the bending, the intensity of the electric current is also increased or decreased. A metallic wire made of various metals soldered together produces, other conditions being the same, a less intense current by bending than when the wire is made of one and the same metal.—*Chemical News.*

MEMOIR ON THE CHEMICAL EFFECTS DUE TO THE CALORIFIC ACTION OF POWERFUL ELECTRIC DISCHARGES.—M. Becquerel.—After describing minutely and at length his apparatus and method of experimenting, the eminent *savant* states that the reduction of the oxides of silver, lead, tin, and copper is obtained by mixing these substances with some charcoal-dust, and exposing them to the heat derived from an electric discharge (powerful induction apparatus) in U-shaped tubes, while the oxides of nickel, cobalt, iron, and chromium, similarly mixed with charcoal-powder and some powdered sugar, and put into a platinum crucible, are also reduced; silica and alumina are fused, and sometimes small crystals are found in the fused mass.—*Chemical News.*

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CONDUCTIVITY OF PRINCIPAL WESTERN WIRES.

The following tests have recently been made of the wires which comprise the main through Circuits between the principal Western cities, and show that the resistance to conduction is low in all of them, and that there are few, if any, bad joints:

CHICAGO CIRCUITS.

No. 1, New York	17.3	ohms	per mile.
2, "	19.1	"	"
3, "	10.8	"	"
4, "	20.5	"	"
1, Buffalo	18.3	"	"
2, "	19.3	"	"
1, Omaha	21.3	"	"
2, "	25.3	"	"
1, St. Louis	21.7	"	"
1, Louisville	19.2	"	"
1, Cincinnati	16.1	"	"
2, "	20.8	"	"
1, Pittsburgh	19.	"	"
1, Quincey	20.	"	"

ST. LOUIS CIRCUITS.

No. 1, Pittsburgh	19.1	ohms	per mile.
1, Kansas City	16.8	"	"
2, " "	19.4	"	"
1, Memphis	20.4	"	"
1, Cincinnati	20.2	"	"
2, "	19.	"	"

CINCINNATI CIRCUITS.

No. 1, Pittsburgh	19.4	ohms	per mile.
2, "	22.4	"	"
1, Buffalo	19.4	"	"

BUFFALO CIRCUITS.

No. 1, Cleveland	19.6	ohms	per mile.
2, "	35.4	"	"
3, "	23.	"	"
1, Detroit	22.	"	"

REWARD FOR ELECTRICAL IMPROVEMENTS.

By a decree, dated April 18, 1866, of the Minister of Public Instruction in France, a prize of 50,000 francs ($10,000) was offered for the most useful application of the voltaic pile, the period for competition to expire in April, 1871. From a report of the minutes presented by the President of the Republic it appears that candidates are few in number, and that, in the opinion of the *savans* to whom the memoirs were submitted, none is of sufficient merit to have earned the prize. By a decree of the 29th of November, the competition is now extended for another period of five years, to terminate on November 29, 1876.

THE POSTMASTER-GENERAL AND MR. SCUDAMORE.—The Postmaster-General has condemned Mr. Scudamore's over-vigorous action in the matter of delaying private telegrams. There has been some confusion in this case between the powers of the Post-office and that of the Home Office, and Mr. Graves has argued that the Postmaster ought to have the same rights as regards telegrams that the Home Secretary has as regards letters. But all necessary rights of this kind are already vested in the Home Secretary as the Minister specially charged with the maintenance of public order. Any letters or telegrams by which, in the opinion of the Government, this would be seriously threatened, would at once be stopped. What the Postmaster-General is charged with is the transmission and delivery of such written or telegraphed communications as the public choose to intrust to him. In Mr. Scudamore's case there was the further irregularity that this kind of power was assumed not by the Minister who can be called to account in Parliament, but by the chief of the permanent Staff.

FAMILIAR TELEGRAPH TALKS.

Before speaking of the local battery, we had better finish the operating table. There are a good many interesting points there which will bear talking about.

THE MAGNET.

The magnet is the operator's capital. It is simple enough, yet demands conditions of structure and care.

It is a very important matter for an operator that the core of his magnet be well annealed, and of proper size and length. A poorly annealed core, by which is meant the imperfect process of softening the iron, is a great obstacle to the comfort of an operator's work. To secure a good core, preference is given by some to iron which has been hammered. Alfred Vail used to make his cores out of old chains, horse shoes, and articles which had been beaten into shape. We do not know how particular makers now are in this respect, or indeed how much real advantage was attained by it. The idea was to increase the amount of fibre as compared with the crystal portion of a common iron rod; any one breaking an iron rod will see the difference between the centre and edge; the centre has little cohesion or compactness; the edge is close grained, fine, powerful. To anneal the core properly, all work should be finished upon it before it enters the fire. The fire should be so made that by covering with ashes or slack, its life may be prolonged for a day or more, and die out very slowly. When taken out, no hammer or file, or chisel on the turning lathe should be used upon it; and when put in its place, and in use, the armature should never be allowed to touch it. Every blow it receives, every violent current passed through it, tends to harden and make it retentive of magnetism, instead of giving it up freely and fully as in its perfectly annealed state. Hundreds of operators know how much trouble they have had with their magnets in having to adjust their armatures so far from the cores to get rid of their permanent magnetism, as to render the reception of messages tedious and uncertain. Electro magnets will, we think, be made so as to permit the cores being easily removed and re-annealed when necessary. All Western Union magnets are now so made.

The winding of a magnet with the silk-covered wire is as if it were wound on a straight shaft, and then bent. If the two bobbins of a magnet were wound in the same way or direction, they would neutralize each other. There has been a good deal of controversy as to the comparative advantages of a long over a short core. Many contend that inasmuch as the coils of the wire nearest the core, when charged with the current, are the most powerful, that a long core upon which this maximum power could be applied, is best. In theory this seems true and reasonable; yet what is gained by the nearness of the current is lost apparently by the separation of the poles—at least experience has seemed to establish the fact that comparatively short magnets are the best.

Judge Caton has constructed a magnet by which he not only preserves a short core, but secures the advantage seemingly due to one made long. He uses four bobbins, acting on a double armature, or an armature at each end of the arm on which the armatures are usually placed. This gives two cores, two faces, and with an amount of wire not greater than on an ordinary magnet, yet disposed so as to be near and acting sharply on the core. Many claim this magnet to be superior in prompt magnetization and power, *i. e.*, the current acts promptly upon it, and the action is clear and sharp. Ordinarily, magnetization is comparatively slow, as compared with its departure. In the amount of wire wound upon a magnet, great mischief has heretofore been done. To secure apparent power, the wire has been made very fine, and the convolutions not only made very close, but multiplied beyond all reason. This was the case with the Bradley magnet, once thought so excellent. So great was its resistance that, when Mr. Varley tested the various magnets in use, he found a Bradley exhibiting a resistance of 906 ohms, or equal to seventy miles of line wire! He had on convolutions of wire which only acted as an obstruction, and which never gave a unit of power to the core. These were simple obstructions, and some magnets were worse than Bradley's! The wire also was very small. The size of wire on a magnet, indeed, should correspond to the length of the circuit and the number of its offices. For a long circuit the wire may be fine, without harm. The ordinary number of wire used is 32. The following are the items of a magnet, as now made:

Length of bobbin	1⅝ inches.
Diameter of core	⅞ "
Diameter of bobbin	1⅛ "
Size of wire	32.
Resistance	125 ohms.

It is of great importance in winding the wire on a core, that the first layer be carefully seperated from it, and yet proximity preserved. There is the utmost danger when the silk covered wire is laid, without intervention of any other substance, against the core. Mr. Varley found, by testing the magnets in the main operating room of the New York office, that out of sixty-four magnets in use, eight had had the silk next the core burned, supposably by lightning, and the core had become metallically connected with the main wire. This is especially harmful in way offices where locals are placed in damp places, as they often are. It only requires the armature to touch the face of the core to connect the main and local wires, and thus cause an escape. In every case it exposes the main current. Magnets in this condition are easily detected by applying one local wire to the entering main wire post, and the other to any part of the core.

Culley has two notes on magnets, which we give:

"In four magnets, wound proportionately, 2, 4, 8, and 16 inches long, and respectively ¼, ½, 1, and 2 inches in diameter, placed at distances of 6, 12, 24, and 48 inches, the attractive face will be the same.

"A hollow core is less powerful than a solid one; but if its ends are made solid there is no great difference. The poles of an electro-magnet should never be smaller than the core."

A DAY or two since, a man not over and above familiar with the dark ways of telegraphing, went into one of the offices in this city with a dispatch, which he insisted on having sent off immediately. The operator accommodated him, and then hung the dispatch on a hook. The man hung around some time, evidently unsatisfied. At last his patience was exhausted, and he belched out: "Ain't you going to send that dispatch?" The operator politely informed him that he had sent it. "No yer ain't," replied the indignant man; "there it is now on the hook."—*Commercial*, Bangor.

AUTOGRAPHIC TELEGRAPAH APPARATUS.—M. d'Arlincourt.—This paper contains a detailed account of the description and mode of manipulating a kind of apparatus which has been tried in France on a telegraphic line of which the two termini are 900 kilometres distant from each other; the velocity of transmission is the same as Hughes's apparatus (forty dispatches per hour); the results are said to be satisfactory in all respects.—*Chemical News*.

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EVANSVILLE, Ind., January 23, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—In your remarks in the JOURNAL of January 15, under the head of "Incivility," you say "We must speak of our experience sometime," &c. I, for one, beg that you will give us more of your experience, through the JOURNAL, for I know there is no one better qualified to instruct us. I have amongst my *treasures*, your Circular, dated Louisville, Ky., June 1, 1852. "To the gentlemen connected with the offices of the United New Orleans and Ohio and People's Telegraph Lines." I was one of the operators who had the pleasure of obeying the orders in that Circular, and it has been my guide in governing those under my superintendence. I hope all Telegraph officials will read the article in JOURNAL of 15th, and follow your advice. God bless you in your efforts in our behalf, is the prayer of,

Yours truly,

N. M. BOOTH, Supt. O. R. T.
and Manager W. U. Office, Evansville, Ind.

To the Editor of the Journal of the Telegraph.

DEAR SIR:—I am frequently asked the cause of the humming noise heard at the poles and in the offices along a Telegraph line, but am unable to answer it, and would solicit an explanation in the next issue of the JOURNAL. I have noticed it in all kinds of weather, both Winter and Summer. I formerly worked on a line running North and South, and noticed the noise was much louder there, than on lines running East and West. An explanation in the next number of your JOURNAL will be thankfully received, by a YOUNG OPERATOR.

Simply vibration caused by the wires. As the prevailing winds are from the West, a North and South line will vibrate most.

DEAR SIR: Will you please give me the date and year that the first telegraph line was put in operation, and from what points it run; also the age of Prof. Morse. W. D. WILSON.

Washington to Baltimore, 1845. Prof. Morse was 80 April 27, 1871.

TELEGRAPHY.—W. C. Barney, Washington, D. C.—*Feb.* 6.—This improvement in means of transmitting telegraphic messages consists in sending the message over the ground line from a transmitting to a receiving instrument before it has made a transit of the wire; that is to say, by placing the transmitting instrument between the positive pole of the battery and ground, and connecting the air-line with the negative pole of battery. Also, in a novel method of arranging the message-receiver or message-repeater between the ground wire and negative pole of the battery.

ELECTRO-SIGNALING APPARATUS FOR FIRE-ENGINES.—W. H. Mumler, Boston, Mass.—*Feb.* 6.—Among the more notable points of this invention is a novel process of signaling from the hoseman to the engineer or foreman of a steam fire-engine, by means of electro-magnetism. Also, the combination with a fire-engine and the leading hose thereof of a battery and signal mechanism located on the engine, and conducting-wires leading from said battery and signal mechanism to the leading hoseman, and a suitable circuit-closer at or near the "butt" or discharge-pipe, for the purpose of transmitting signals from the hoseman to the engineer or foreman. Also, in combination with each length of the leading hose, a cable consisting of one or more insulated wires attached thereto, either inside or outside of the hose, and provided with suitable couplings for uniting two contiguous lengths, and insuring a connection between the same.

ELECTRO-MAGNETIC APPARATUS.—G. Little, Rutherford Park, N. J.—*Dec.* 26.—In this apparatus an oscillating armature and two helices are connected to the main line, and used in combination with a local current connected with one of the helices. The invention also includes an oscillating armature upon a fulcrum connected with the cores of two electro-magnets, in combination with two electric currents connected with the helices of said magnets. A supplemental combination of devices is covered by an additional clause of the claim.

THE PRESERVATION OF POLES.

The life of a telegraph pole has usually been set down as an average of ten or twelve years. Practically, by cutting down and resetting, they last some years longer. Even with this allowance, it must present a serious item of regular prospective outlay, that in a line of one hundred thousand or one hundred and twenty-five thousand miles, ten thousand miles, or three hundred thousand new poles have to be provided and planted each year. The subject has engrossed much attention also in reference to railroad ties, the consumption of which is enormous. It is clearly one of the most important practical questions how these may be preserved.

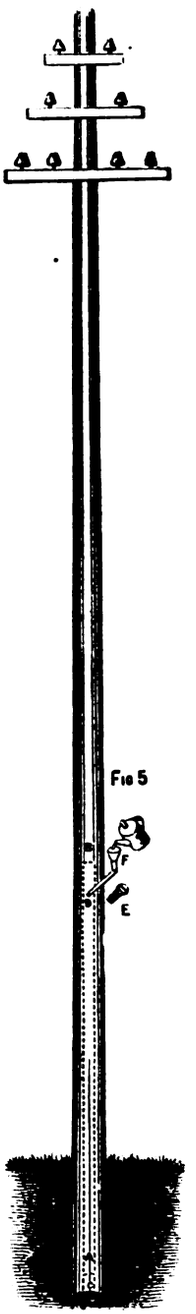


FIG 5

Our old friend, Col. E. Webb, offers a most simple, and yet, from the testimony presented, a most effective check to this decay. He has secured an auger capable of boring a pole or log to any required depth. Into this is poured, without either heating or pressure, an inexpensive liquid, which, by its own action, permeates the whole body of the wood, taking the place of the natural sap, and doubling or more the life of the material into which it is thus infused. As the sketch shows, the poles being bored before planting, and which does not at all weaken them, the liquid can be inserted after erection.

January 13, 1872.

To the Editor of the Journal of the Telegraph:

Money and time would be saved to our Company, if, in explanation of errors, managers would send *copies* of missing messages.

For instance, I mail my list of totals to another office. It is returned, saying, "Check you on ——. Signed ——. Date, ——." And I then have to request a *copy* of the message, which should have been sent before, and a delay of two weeks occurs in case the difference is with a California office.

R. R. M.

WATERTOWN, N. Y., Feb. 19, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—I would like to inquire whether Mr. Orton's proposition, to donate one hundred dollars as each death occurs, applies to all members of the Association, or only those in the employ of the W. U. Company. If it does not, will we that work for other companies, leave nine hundred or one thousand dollars to our friends, when we "shuffle off this mortal coil."

Yours truly,

DEXTER VAN OOSTRAND.

ANSWER.

We answered this in our last. The Western Union Telegraph Company cannot be expected to give one hundred dollars to the employee of another company. Every Telegraph Company must do its own benefactions for its own men. It is an *addition* to a "thousand dollars," not to make up that amount.

THE following occurrence is vouched for as taking place at Carlsruhe, dated Dec. 7th:

An aged mother came last Saturday to the telegraph office carrying a dish full of saurkraut which she desired to have telegraphed to Rastadt. Her son must receive the kraut by Sunday. The operator could not convince her that the telegraph was not capable for such a performance.

"How could so many soldiers have been sent to France by telegraph" she answered, and finally departed grumbling that on our railroad everything was asked.

MEASUREMENT OF THE VELOCITY OF CANNON BALLS.

A very ingenious instrument, known as Noble's Chronoscope, is used for measuring the velocity of shot during its transit through the gun. The tube of the gun is fitted inside at certain intervals with metal rings (to the number of six or eight), the outside margins of which are sharpened into knife edges. As a shot passes along the tube and through these rings, the edges of the latter are jammed down upon, and made to cut through, the ends of various insulated wires, one of which is placed under each ring. Each of these wires is connected with an electric battery, and, as one wire after another is cut through and the insulation removed, an electric current passes, and a number of electric sparks follow one after another, according to the number of the rings and wires. The recording of signals is accomplished by means of a series of metal disks, one in connection with each, which are made to revolve at a certain known velocity. The surface of the disks is of polished silver, coated with lampblack. As soon as a wire is cut by the passage of a shot, a spark hops over to the recording disk, removing a little of the lampblack coating, and thus marking the place by leaving a bare minute spot of bright metal. From the relative position of the successive spots on the disks, and the known velocity at which they revolve, a simple calculation determines the velocity of the shot. A shot usually takes from one two-hundredth to one three-hundredth of a second to traverse the whole length of the bore of a large gun, its speed being somewhat slow when passing the rings, and increasing as it approaches the muzzle of the gun. From the extreme delicacy of the instrument, the calculation can be made with precision to a millionth part of a second, and the velocity determined with the greatest accuracy.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JAMES D. REID, Editor,

Executive Rooms, Western Union Tel. Co.,

145 Broadway, New York.

NEW YORK, MARCH 1, 1872.

DISCHARGED FOR DRUNKENNESS.

Once a month or so there appears on our desk a manifold copy of the official report of discharges from the service. We have never published them. We fear to put the damning publicity to a weakness which calls as often for pity as for reproach, or hold up to scorn those who by patience and gentleness may be saved. The discharge is a necessity. No drunken man should ever handle a message, and a careful executive might even exact as the qualification for employment that rum and all its relatives be foresworn. But we prefer that the discharge be not complemented with the published shame. The lapse is sometimes the fall in a keen struggle. God only knows how keen and fierce the struggle sometimes is.

In Mrs. Stowe's "Wife and I" there occurs one of those stirring passages regarding this degrading vice which reveals its desperate tyranny. It is Bolton giving his reasons why he dare not marry:

"One sip would flash to the brain like fire, and then, all fear, all care, all conscience would be gone, and not one glass, but a dozen would be inevitable. Then you might have to look for me in some of those dens to which the possessed of the devil flee when the fit is on them, and where they rave and tear and cut themselves until the madness is worn out. This has happened to me after long periods of self denial and self control and illusive hope. It seems to me that my experience is like that of a man whom some cruel fiend condemns to go through all the agonies of drowning over and over again—the dark plunge, the mad struggle, the suffocation, the horror, the agony, the clutch at the shore, the weary clamber up steep rocks, the sense of relief, recovery, and hope, only to be wrenched off and thrown back to struggle, and and strangle, and sink again. If I had fallen dead after the first glass of wine I tasted, it would have been thought a horrible thing; but it would have been better for my mother, better for me, than to have lived as I did."

This picture of a noble man, who knew his weakness and his enemy, is only one of many such, not always so intense, but dark and dread with ever-constant danger. It may be a voice to some young man who reads it as he is about to yield to the first invitation to drink that, which may be, within him, like the flames of hell. Let the cursed thing alone, young men. The bright water that gurgles up from the earth or glistens down the mountain-side is for all men health and hope and happiness and life.

WHAT IS AN INVENTION?

If this question is properly answered, it will take from the field of polemics a great deal of misunderstanding and misconception, and prevent many an angry discussion.

We answer the question, then, in the first place, negatively. It is *not* the discovery of a principle in nature. The principle is in existence before its discovery. The discovery of a hitherto hidden principle, however, confers honor on the discoverer, as in the case of the discovery of the principle of voltaic electricity, the bringing forth for application of an important scientific fact not before known. Invention is the application and successful adaptation of the discovery, by means of known appliances, to the production of a certain novel result or results. In fact, it is the *combination* of these known appliances, with or without any new discovery, or with further discoveries, which is, emphatically, INVENTION. Every combination of parts, to whatever extent these parts may be in common use, such as wheels, levers, springs, &c., put into form for the purpose of producing a special effect, is an invention. The patent laws recognize the distinction between a "discovery" and an "invention." The former is not the subject of a patent; the latter is. In the publications of the French Academy there is a department, "Applied Physics," which, by its title, recognizes this distinction, and under this head is given, in the *Comptes Rendus*, the invention of the telegraph. Mr. Morse, in his speech at the banquet given him in New York, at which the eminent Chief Justice Chase presided, distinctly announced that "*invention is combination*," and it cannot be more accurately condensed than in this brief sentence. "It is only," says Morse, "when "the nature of *invention* is properly understood, that "the justice of the ascription of honor to the indi- "vidual inventor is perceived. *Invention is, emphati- "cally, Combination, an assembling or putting together "of things known, whether discoveries or other inven- "tions, to produce a new effect, to create a new art.*"

SOME year or more ago, we wrote an article for the JOURNAL, which we indited on the sill of a farm house window in western New York, whither we had gone for the benefit of buttermilk and fresh air. Its topic was *Automatics*, upon which we dilated with all the poetry inspired by churns and sheep and green fields. We were not very discriminating in our eulogy; how could we be when the sun was automatically warming us, and the hens were automatically laying eggs for us, and the farm cat automatically rubbing her brindled sides against our summer trousers? And so it happened, that not knowing the automatic divinity which with buttermilky joy we sung our sonnet to, all the automatics fancied we meant each one of them—Bain, Wheatstone, Hummiston, Little, Craig, every soul of them. And we had a sad time of it to get these damsels righted, and to get other people convinced that we did not mean them at all. Of course they were all mad, for they all wanted a good looking man to court them, and they were willing to accept us, but Barkis wasn't. Barkis means us. Our automatic lady indeed, was a creature largely of the imagination, although a specimen of the race existed in Europe, leading a lowly and poorly developed life. The system we had then in mind was the autographic telegraph, a vastly different thing from the punched and ribbonly female who has made such a fuss and done so little in the city of New York.

We cannot help thinking that the autographic system of transmitting messages must some day form a feature of American telegraphy. It is certainly a desirable possibility to be able to transmit a message exactly in the chirography of the writer, so that not only will the recipient recognize the hand that wrote it, but transmission be utterly relieved of the least chance of error. Our system in America has not been ripe for this, perhaps, and it will have to take the place of all luxuries, and educational embellishments, coming after all useful and necessary things have been provided. So far, the processes to accomplish it have been too slow, and therefore valueless. Attention, however, seems to have rewarded a European electrician, who has recently exhibited machinery transmitting, successfully, messages at the rate of forty per hour. By this system a signature can be proven, a sketch or plan provided, a likeness sent, a draft with the genuine signature drawn. It is, at least, interesting to know that such processes are developing, however little they may be adapted to our hurried and enlarging correspondence. They can never destroy or supercede the simple processes now in use.

THE words of farewell promised in our last issue, are postponed for a few weeks, during which time we hope to reply fully to all communications on hand.

ANGLO-AMERICAN TELEGRAPH.—In anticipation of their meeting on the 16th day of February, the directors of the Anglo-American Telegraph Company have issued their report. It states that the total receipts for the past year accruing to the Anglo-American Telegraph Company, including a balance of £16,044 carried over from last account, amount to £274,731. The charges for repairing cables, with the ordinary working and other expenses and income tax, amount to £65,678, leaving a balance of £209,053. Out of this amount three interim dividends of 2 per cent. each, free from income tax, have already been paid, absorbing £96,856, and leaving a balance of £112,197. The directors, under the powers conferred upon them by the 164th section of the articles of association, before declaring the net profits, have set apart the sum of £50,000, for a renewal fund, and recommended that the balance, viz. :—£62,179, be appropriated to the payment of a further dividend of £3 3s. 4d. per cent. free of income tax, which, with the three interim dividends already paid, will be at the rate of 10 per cent. per annum, for the eleven months ending 31st December, 1871, leaving a balance of £9,156, to be carried forward to the next account.—*Mechanics' Magazine.*

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THE JOURNAL.

We published a letter in our last issue referring very discriminatingly to the influence of the JOURNAL, and properly directing attention to the true method by which its usefulness can be assured. It rests much more largely in the hands of the operating force than in the Editor. A reflecting man, while pursuing his daily duties, is constantly meeting with some experience which is worthy of record, some difficulty for which some proper method suggests itself to overcome. He owes it to his fellows and his business to state them, so that his experience may have a record and a power. It seems scarcely proper that the Editor should adjudicate in such cases even were he at all times able to judge. He is only a learner with the rest. The man who toils at the operating table, or builds the lines, or hurries out in the storm to restore the injured structure, these are the men to write for the JOURNAL, and point out the remedies which experience suggests to them for any existent evil. The task becomes then that of the electrician. He has data furnished him of practical results, and the testimony and suggestions of experienced men. By his co-operation these may be formulated and worked into a system. Here is the path of true progress: Let every man who digs a hole for a telegraph pole, or erects one, or strings a wire, or manipulates a key, or watches a battery, suggest, how better to do all these, and the intelligence of the whole force will be stimulated and evoked. The personal portion of the article we receive gratefully. We have felt our chief work to be the infusion of fraternity and chivalrous companionship rather than of criticism. A new brain, with enlarged knowledge and with a sprightlier pen, will some day build on that basis an enlarged usefulness and a more substantial power.

ARGENTINE TELEGRAPHS.—The Inspector-General of Telegraphs in the Argentine Republic has notified that on the 16th of November he opened to the public service 400 miles of telegraph from Cordova to Tucuman, belonging to the Argentine National Government, and on the 1st of December 354 miles from Parana to Corrientes, being extensions to 638 miles already opened, making a total of nearly 1400 miles of telegraph, exclusive of provincial and railway telegraphs. On the 1st of January next the tariff on the national lines was to be reduced to a universal charge of 1s. The staff are now constructing the land line to the point where the country joins Brazil, to complete the communication to Rio.

NEW POSTAL TELEGRAPH CARD.—On and after Monday next postal telegraph cards, bearing a shilling stamp, will be issued, for the accommodation of those for whom it will be more convenient to deposit the card in the nearest pillar, letter, or other post-office letter-box, than to send a message to the nearest telegraph station. The telegraph cards will be taken from the boxes along with the other contents at the regular collecting periods, which are always specified on the table on or over the box; and on the arrival of a collection at the proper office, the telegraph cards will be at once picked out and handed over to the telegraph counter clerk, who will deal with them in the ordinary course, obliterating the stamp. No postage is charged, the shilling stamp covering that, and also franking the message on the card to the same privileges as are granted to messages handed in to offices in the ordinary way.

COUNTING GOVERNMENT MESSAGES.

FORT LEAVENWORTH, Ks, Jan. 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR—Allow me to suggest to you the following plan of reform in the manner of counting Government Telegrams, which I think if adopted, will be beneficial to both the Government and profession, in point of accuracy, viz.: let a given uniform number of words represent the address and signature, and transmit only the number of words that it is in the body leaving the designated number of words for the address and signature to be added to the check. I find that in the transmission of Government Telegrams through repeating Offices, operators are in the habit of counting such words as Fort Hays, U. S. Quartermaster, Headquarters, etc., etc., which generally occur in the address and signature of messages, one or two words as may be necessary to make the message count correct. The Company will be materially benefitted by the adoption of this plan, as operators will not have to hold open their key to count every message, but can write four or five words in a line, and count the message as they receive it. I find that from an average of one hundred telegrams sent and received at this Office, that allowing fifteen words for the address and signature of each telegram, would be as near justice to both the Government and Telegraph Company as can be arrived at. R.

A WISE OLD GENTLEMAN.

That Uncle Samuel could buy all the telegraph lines, reduce prices one-half and then make money, is quite apparent when one comes to read that while a private citizen or a corporation can ship goods from New York to Liverpool for from ten to thirty dollars per ton, the government pays nineteen hundred dollars per ton for its mails. The old gentleman is so much more shrewd than individuals that his profits on the postal telgeraph system would be enormous—perhaps almost pay the messenger boys.—*Detroit Free Press, Dec. 14th*, 1871.

THE POWER OF APPRECIATION.

CHARLESTON, S. C., Feb. 24th, 1872.

J. O. BRENNER, ESQ.,
Supt. 3d District, Augusta, Ga.

DEAR SIR:—During the fearful epidemic through which our city has recently passed, six of our number were stricken down, and but for the timely aid which was so promptly and liberally extended, it would doubtless have proved fatal to more than one of our number. As it was, they lacked for nothing that human aid and skill could supply. Those who escaped, through the goodness and mercy of a kind Providence, although but simply in discharge of a duty in performing somewhat more arduous tasks incidental upon the sickness of their co-laborers, have been made to feel that even so small an effort on their part has not been allowed to pass unnoticed, and their services have been fully appreciated.

Therefore we, the undersigned, employees of the Western Union Telegraph Co. at this place, desire respectfully to tender to you, and through you to the Company you so ably represent, our sincere and heartfelt thanks for your and their action toward us.

Our thanks are dictated by grateful hearts, and we pray their acceptance only as an earnest of our desire hereafter to prove, by works, how sincerely and truly we do appreciate such interest in our welfare.

Very respectfully,

(Signed) JOHN D. EASTERLIN,
GEORGE W. BELL,
S. W. CAPERS,
W. J. FLEMING,
D. M. DRISCOLL,
P. E. RYAN,
H. TOYS,
JNO. B. R. SPALDING,
JOS. FLYNN,
FRANK A. DRAKE.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
March 1, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since February 15, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

281 Avon, Ind.	246 Kingston, Ga., re opened.
158 Blue Rapids, Ks.	318 Monticello, Ill.
288 Burdick, Ind.	389 Morrison, Mo.
58 Carbondale, Pa., heretofore an Other Line office.	293 Madison, Ala.
	246 Marietta, Ga., re-opened.
379 Cuba, Mo.	28 No. Leominster, Mass.
* Chester, Conn.	446 Rosendale, Mo.
261 Corunna, Ind.	288 Ross, Ind.
* Coalburg, W. Va.	111 Smethport, Pa., heretofore an Other Line office.
447 DeSoto, Ks.	
356 Epworth, Iowa.	42 Somers' Point, N. J., re-opened.
298 Frankfort, Ill.	
24 Henniker, N. H.	230 Terry's Station, Mich.
231 Holland, O.	211 Vienna, Mich.
220 Highlands, Mich.	288 Whitings, Ind.
299 Knightsville, Ind.	

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.	*Leaves this Line.*
Chester, Conn.,	30 3	Hartford, Conn.
Coalburg, W. Va.,	50 4	Huntingdon, W. Va.

OFFICES CLOSED.

Port Clinton, Pa.; Sunny Side, Ind., and Westover, Md.

GENERAL INFORMATION.

All communications with the Montreal Telegraph Company concerning Montreal Junction "errors," "uncollects," &c., should be addressed "Montreal Telegraph Co., Montreal, Canada," and six cents postage must be pre-paid thereon. If stamped with only a three cent stamp, a charge of ten cents additional is made upon delivery.

Business (including money transfers) with Allegheny City, Pa., will hereafter be checked to Pittsburgh, Pa.

The name of the office heretofore known as Divide, Ks., has been changed to Colony, Ks.; Buchtell, Mich., to Loomis, Mich., and Evans Mills, Ala., to Evansville, Ala.

Centreville, Mich., in sq. 251, is in St. Josephs Co.; Centreville, Mich., on N. W. lines, is in Marquette Co.

Sandy Hill, N. Y., now in sq. 39, will hereafter be in sq. 45.

OFFICES HAVING "SPECIAL SHEET A."

Tariff to Harmsburg, Pa., will hereafter be same as Parkers Landing, Pa., and to Pawtucket, R. I., same as Providence, R. I.

ATLANTIC CABLE BUSINESS.

Pre-paid Replies.—Amounts deposited to pre-pay replies must be entered in account, and remitted as part of the tariff upon the original message; and must not, under any circumstances, be refunded without instructions from headquarters.

On and after March 1st, rates from London, England, to points named, will be as follows:

	Via Falmouth.	*Via Russia.*	*Ordinary Continental rate.*
Hong Kong,	$21 50	$21 50	$35 00
Shanghai,	21 50	21 50	41 25
Nagasaki,	26 50	21 50	46 25

The above rates are for twenty words or under; charge half rates for each additional ten or fraction of ten words.

Where the route beyond London is not indicated by the *sender of a message*, the "Ordinary continental rate" must be charged.

The words "via Falmouth" and "via Russia" are not charged for beyond London.

CUBA CABLE BUSINESS.

We are notified that the Cables from Kingston, Jamaica, to St. Thomas, are now completed, and open for business. The following rates must hereafter be collected:

From Kingston to	*10 words*	*additional words.*
Porto Rico and St. Thomas	$7 50	75c.

These rates must be added to present tariff to Kingston.

Messages for Windward Islands beyond St. Thomas, will be mailed at St. Thomas. In addition to tariff to St. Thomas, collect 25c. for postage.

WILLIAM ORTON, President.

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THE WALL STREET TELEGRAPHIC SYSTEM.

[Correspondence of the Chicago Journal.]

I want to note here a special feature connected with finances in Wall street, and that is the perfection of its telegraph system. Less than five years ago a man invented and brought into the street, a telegraph system, that was at first viewed as a visionary affair, and no man, among all the brokers and bankers of Wall street, could be found to give it either favor or support. Finally, an erratic individual, so called at the time, was induced to invest $3,000 for a quarter interest in the new invention, and to give it a test. It did all the poor inventor claimed for it, and more, and the brokers in whose office it found a place for experiment, became interested in it, and a joint stock company, with a nominal capital of $250,000, was formed, and business entered upon. A central location was chosen for the general office of the company; wires were run out to a few offices, and to the stock and gold bonds, and a few instruments put in. The effect was wonderful. Instantaneous communication had been established so that prices could be telegraphed from the Board to the general office, and from there to the several brokers' offices, much quicker than the news could be carried by the messenger boys at that time universally employed. It soon became a necessity for a broker to have such quick communication with the stock and gold Boards, and the system has grown into such favor that now there are not less than one thousand offices, including every bank, broker's office, hotel, express company, dry goods and other establishments, furnished with them.

These thousand offices, as I have said, are connected with the general office of the Company, and this again with the Stock and Gold Boards. In each of these offices is a small instrument, placed upon a neat little bracket on the side wall, and covered by a glass globe. The instrument has two wheels, on one of which are the letters of the alphabet, on the other, simply the nine digits, and fractions of ⅛, ¼, ⅜, ½8 and so on. Resting on the top of each wheel is a small circular pad saturated with ink, beneath a strip of paper an inch wide, on a small drum, and which is forced through by a small ratchet work, and brought against the wheels. In the general office sit two men at a table; on it is a small instrument similar to that in use in the ordinary offices of ordinary telegraph companies, for the reception of messages. The operators in the Gold and Stock Boards send the prices of each particular stock as dealt in, giving number of shares and price, and as there is a constant deal, from 10 A. M. to five P. M., on a long list of stocks, at every shade of price the quotations are incessant. These he notes in a book made for that purpose. Before the other man seated at the table, are two large dials like the face of a clock; on one are letters to correspond with one of the wheels of the instrument for printing and describing; on the other are the numbers and fractions. He moves the hand upon the dial to G; the one thousand little wheels revolve to G. With the other hand he touches an instrument that throws the paper against the wheel, and G is printed in one thousand offices at once. He touches the dial on the other side and figures 109 appear in quick succession, and we have as the result the quotation of gold, 109. Thus is communicated in the space of one minute, the prices of half a dozen stocks from the Board to one thousand offices throughout the city, and printed in type any child may read. The banks are thus connected with each other, and with the Clearing House. It is more like the power of magic than the result of human ingenuity.

AGRICOLA.

IS IT FAIR.

CHICAGO, February 20th, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—I notice in Journal of recent date, a hint that the Executive Committee of the Telegraphers Life Insurance Bureau have accepted the offer of President Orton of Western Union Telegraph Company, that the Western Union Company would donate one hundred dollars to the heirs of each member dying while in the employ of the Western Union Company. But, if a member was in the employ of any other company, they would only receive one thousand dollars, instead of the dollar for each and every member in good standing, that is: there are now something near fourteen hundred members and probably not less than twelve hundred members will pay their assessments when due, so if a member in the employ of any company except the Western Union, is unfortunate enough to die, his heirs will be deprived of at least two hundred dollars, that actually belong to them. It is very liberal on the part of the Western Union Company to give their employees' heirs the hundred dollars, but when other members are cut off, it is very unjust to them in my opinion.

I claim that each and every member is entitled to the dollar for each and every other member, who pays his or her assessment. If the Western Union operators choose to accept Mr. Orton's offer, to take only one thousand dollars, providing the Western Union Company will give their heirs a bonus of one hundred dollars; that is all right, but I think it unfair to members, not in the employ of the Western Union Company, to compel them to take only one thousand dollars, when they are entitled to twelve hundred, and that too without the consent of the members themselves, or at least a majority of them, who are not in the employ of Western Union Company. I should like to hear from others through your columns, and see if I stand alone.

Respectfully yours, GEO. W. LEE.

ANSWER.—The question of limiting payments to one thousand dollars, is one that has nothing properly to do with the hundred dollar bonus, but should be looked at as a matter of policy merely. The membership is increasing rapidly, and the deaths will likely also increase. The question is, whether the members prefer to have a payment of a larger sum than one thousand dollars and pay an increase of assessments, or reserve the collections over one thousand dollars to meet some of these assessments and so limit practically their number. The bonus is a mere incident in connection with this question, and has properly nothing to do with it. The time indeed has not come to make it a question at all, for the heirs of Charles A. Kellogg only received $831, bonus and all, the number of delinquents is so great, as may be seen by the JOURNAL of February 1. Probably the matter will be reserved for decision at the annual meeting. One hundred and fifty new members have been added since January 1, and we have reason to hope that these new additions will bring to the associations increased steadiness and vitality.

MR. ROBERT B. HOOVER whom all will remember as the first to suggest a testimonial to Prof. Morse, and which eventuated in the statue in Central Park, has resigned his post as manager of the W. U. Teleg. Co., at Alleghany City, Pa., and accepts the position of Telegraph Superintendent, a Train Despatcher of the Marietta and Cleveland Railroad. It augurs much for the success of any enterprize when thoroughly worthy men, bearing an honest record of consistent fidelity and capacity are placed in executive position in connection therewith. That this has been done in the present case all who are acquainted with Mr. Hoover know. God bless him.

A FIREPROOF MAN.

About the year 1869, one Lionetto, a Spaniard, (writes a French chemist) astonished not only the ignorant, but chemists, and other men of science, in France, Germany, Italy and England, by the impunity with which he handled red hot iron and molten lead, drank boiling oil, and performed other feats equally miraculous. While he was at Naples, he attracted the notice of Professor Sementeni, who narrowly watched all his operations, and endeavored to discover his seerct. He observed, in the first place, that when Lionetto applied a piece of red hot iron to his hair, dense fumes immediately rose from it, and the same occurred when he touched his foot with the iron. He also saw him place a rod of iron nearly red hot between his teeth without burning himself, drink the third of a teaspoonful of boiling oil, and taking up molten lead with his fingers, place it on his tongue without apparent inconvenience. Sementeni's efforts, after performing several experiments upon himself, were finally crowned wtth success. He found, that by friction with sulphuric acid, diluted with water, the skin might be made insensible to the action of the heat of red hot iron; a solution of alum, evaporated until it became spongy, appeared to be more effectual in these frictions. After having rubbed the parts which were thus rendered in some degree insensible, with hard soap, he discovered, on the application of hot iron, that their insensibility was increased. He then determined on again rubbing the parts with soap, and after this, he found that the hot iron not only occasioned no pain, but that it actually did not burn the hair. Being thus far satisfied, the Professor applied hard soap to his tongue, until it became insensible to the heat of the iron; and having placed an ointment composed of soap mixed with a solution of alum upon it, boiling oil did not burn it; while the oil remained on the tongue a slight hissing was heard similar to that of hot iron when thrust into water; the oil soon cooled, and might then be swallowed without danger. Several scientific men have since, it is said, successfuly repeated the experiments of Professor Sementeni, but we would not recommend any but professionals to try the experiments.

WE are reluctantly compelled to omit assessment acknowledgements until next issue,

MARRIED.

COX—BOWERS.—At Bells, Tenn., by Rev. J. A. Carter, Mr. W. A. Cox, of W. U. office, Batesville, Miss., to Miss Sue Bowers.

BARNARD—LAWRENCE.—At Berea, O., Nov. 22, 1871, J. M. Barnard, of Berea, O., to Miss Eva Lawrence, of Olmstead Falls, O.

DAVIS—LANGE.—On the 17th inst., in Lawrence, Ks., by the Rev. F. M. Ellis, Jos A. Davis, Tel. Operator in the General Supt's Office of the L. L. & G. R. R., to Miss Maria T. Lange, all of Lawrence.

ENGLE—NCINTIRE.—Married Dec. 31st, 1871, by Rev. W. H. Pierce, A. C. Engle, operator, to Miss Lucinda McIntire, both of Dunkirk, Ind.

MEAD—BEEM.—At the residence of the bride's father, near Spencer, Ind., Dec. 28th, 1871, by Rev. G. F. Culmer, Mr. W. Stanley Mead, Manager W. U. Tel. Office, and Agent J. B. & W. Ry., Jamestown, Ind., to Miss Amma Beem.

BORN.

NYE.—At La Cross, Wis., February 12th, to J. M. Nye, a daughter.

LONG.—To W. C. Long, of W. U. night force, Chicago, Ill., January 2, a daughter—good sounder.

DIED.

ARNOTT.—At five o'clock, Monday morning, Feb. 19th, at the Union League Club, this city, F. George Arnott, after an illness of seven weeks of pneumonia, aged 20 years, 3 months and 19 days.

TURNER.—Died, Dec. 29th, 1871, Sophy M. Turner, beloved wife of D. N. Turner, Agent C. & N. W. R. R., Elgin, Ill., daughter of Dr. M. Prezinger, Euphemia, Preble Co., Ohio. age, 26 years and 7 months. For over two years Mrs. Turner was a patient sufferer from consumption. Just a few evenings before she died, when friends spoke to her of the beautiful christmas tree at church she said, "I soon shall see a far more beautiful sight, Jesus himself." She died calmly. A husband and little son mourn her loss.

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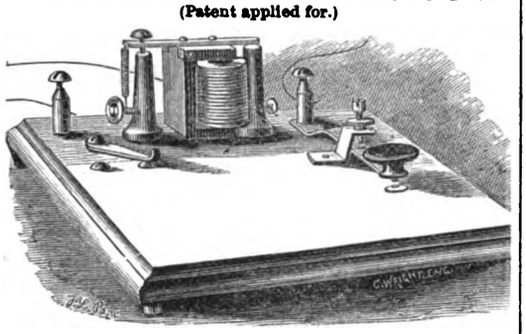
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By means of a switch, which is now placed on each instrument, they can be worked as desired, either as the open or the ordinary continuous, or closed circuits.

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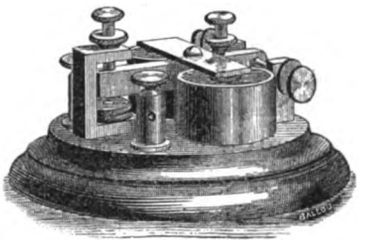
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is now in operation in the following cities, to which reference is made for evidence of its great SUPERIORITY, VALUE and UNIFORM reliability:

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Chicago, Ill.,	Pittsburg, Pa.,
Cincinnati, Ohio,	Portland, Me.,
Columbus, Ohio,	Peoria, Ill.,
Cambridge, Mass.,	Providence, R. I.,
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Covington, Ky.,	Rochester, N. Y.,
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Fall River, Mass.,	St. John, N. B.,
Fitchburg, Mass.,	Springfield, Mass.,
Hartford, Conn.,	San Francisco, Cal.,
Jersey City, N. J.,	Savannah, Ga.,
Louisville, Ky.,	Syracuse, N. Y.,
Lawrence, Mass.,	Troy, N. Y.,
Mobile, Ala.,	Toledo, Ohio,
Montreal, Canada,	Toronto, Canada,
Milwaukee, Wis.,	Washington, D. C.,
New York City,	Worcester, Mass.,
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The distinctive features of these systems of

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ARE,

First—The AUTOMATIC SIGNAL BOXES, the simple electro-mechanism of which enables any one—even a child—to give an *instantaneous, general,* and *definite* alarm of fire.

Second—The AUTOMATIC REPEATER, through which the apparatus may be distributed in a combination of circuits, and the entire system successfully worked without the constant personal attention of either operators or watchmen.

Third—The ELECTRO-MECHANICAL BELL STRIKERS, adapted to produce the full tone of the largest church or tower bells.

Fourth—The ELECTRO-MECHANICAL GONG STRIKER, for hose and engine houses, by means of which the location of the fire is instantaneously communicated to the members of each fire company.

These features combined form the

ONLY PERFECT, COMPLETE, AND RELIABLE SYSTEM

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Messrs. GAMEWELL & CO. are the owners of the original *FARMER AND CHANNING PATENTS,* one of the most important of which has just been extended for seven years. During the past seventeen years they have spared no expense or effort to secure improvements, and the systems are now covered by

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The introduction and operation of the

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involves so little expense, compared to the benefit which it confers, that even small communities can profitably adopt and maintain it.

The co-operation of TELEGRAPHERS in securing its introduction into their localities is cordially invited, and their efforts will be duly appreciated and compensated.

Any information desired in regard to the above system will be cheerfully and promptly furnished upon application at the office.

A pamphlet setting forth more fully its advantages and superiority, has been printed, and will be supplied to Municipal Authorities and others interested in Fire Alarm and Police Telegraphy upon application as above.

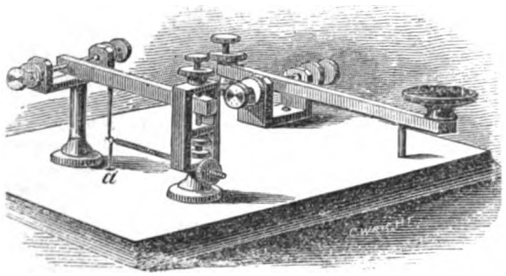
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To the Editor of the Journal of the Telegraph:

I am reminded of the days when I was young in years, and telegraphing by a young lady who is "Morseing" it, in great profusion, under my instruction. Standing beside her the other evening, while she was making her first enquiry for "No. 21," I noticed her key was open, and inquired why she didn't close it; "Oh!" said she, "I want to wait and see what he is going to say!" She is desirous to become a sound operator. In answer to her question "How long it would take," I thoughtlessly said three months or so, and, with that gallantry which characterizes (?) the profession in their intercourse with "beginners" I consented to give her a lesson semi-daily. At the close of the first one, (30 minutes duration) she solemnly informed me that she thought what I had been calling (H B) sounded some like a "C"! with an imagination so lively, will not three months witness perfection? Another young lady — evidently new to the business, while in office recently, noticed a bunch of W. U. T. Envelopes in close proximity to one of the relays, and modestly enquired if I "usually received them that way"? They have some enlightened operators on the new line from St. J— to S—n. One of them gave me a call not long since personally, I was favorably impressed, I supposed he was a Supt., at least, till he astonished me by placing his hand on a key, and asking me if I worked "all them three wires" with it? One word for the benefit of any perplexed brother and I am done. I scold sometimes—I did when Capt. K—— brought me a message some one had handed him from train, I couldn't read it and I said so. Why, said he, "do as I do when I am copying, make the letters just as nigh like his as you can and let it go at that!" EXNTITE.

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For Students, Colleges, &c. No battery required. An ordinary key and sounder is placed upon a proper base. The sounder is moved by a lever under the base, connected with the key, making a perfect instrument for those wishing to learn the Art of Telegraphy. An expert could not tell, without examining it, that the instrument was not worked by a battery.

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Hundreds of persons throughout the country desire to become expert Telegraphists, and are constantly seeking permission to practice in the various telegraph offices.

This instrument is an outgrowth of this pressing demand. The Inventor is himself a practical operator, now in active service. Operators and others wishing to teach or learn the Art, will be delighted with this instrument.

It can be placed anywhere, as it does not occupy a space more than six inches square.

Its cost is but $7, and there is no expense whatever to keep it constantly in working order.

We will send a copy of SMITH'S MANUAL, free of charge, with each instrument, to individuals or clubs. The instructions in this Manual are particularly adapted to those who wish to learn by sound.

Special and liberal terms to manufacturers.

Remittances can be made by certified draft on New York, Cleveland, or Pittsburgh, money by express, charges paid, post office order, or registered letter at our risk.

Parties ordering instruments, from points except well-known cities, will please give the name of county and State.

Price, $7. Silver Plated, Extra Finish, $10.

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For the accommodation of the SOUTH AMERICAN, CUBAN and MEXICAN TRADE, we shall hereafter keep a stock of the Celebrated

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No. 9, Plain Annealed.....4¼ cts. Gold.
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This Brand of Wire is the best in the world, and has been adopted exclusively by the Western Union and many other Telegraph Companies.

We also continue to import this Wire for use in this country, notwithstanding the high rate of duty imposed by Congress in the interest of the monopolists. Any amount of it can be seen at our store at all times. The import duty on wire is now two cents per lb. gold, and 15 per cent. *ad valorem*.

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Cedar Holders, for Desk			$0 50
Ebony " "			0 60
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Pocket Holders, Plain,	" "		1 75
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Six Cedar Desk Holders to one order			2 00

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OPINIONS.

NEW YORK, March 15, 1871.

Telegraph operators especially will find it almost indispensable after once having used it. All who have used it in this business speak very highly of it.

FRANK L. POPE,
Associate Editor of the "Telegrapher."

NEW YORK, April 21, 1871.

I fully accord in the above opinion of the Self-Supplying Pen-Holder, having tested it for some time.

SAMUEL F. B. MORSE.

FRANK L. POPE,

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 8. NEW YORK, MARCH 15, 1872. WHOLE NO. 105.

THE INVENTOR OF THE GROVE BATTERY.

MR. GROVE is the son of a Welsh gentleman of property, and was born in Glamorganshire, in 1811. He was educated at Brasenose College, Oxford, and took his M. A. degree in 1838. He studied law in London for two years, and was called to the bar of Lincoln's Inn in 1835. Being compelled by ill health to surrender the more active duties of his profession, he, fortunately for science, devoted his brilliant intellect to the investigation of physical phenomena, especially those of electricity. One of the first productions of his researches was his invention in 1839, of the voltaic battery which has given him a world-wide fame. Subsequently, in 1840, he received the chair of experimental philosophy at the London Institution, and continued to occupy it for seven years; and it was in the fulfilment of his duties as a lecturer that his courageous originality and penetrating diagnosis were shown in the assertion of the correlation and mutual convertibility of the various species of force. This announcement, one of the most brilliant lights over the field of nature which has ever illuminated the path of the investigator, and one of the greatest discoveries which has been made since Newton promulgated the laws of gravitation, is now universally accepted as indisputable truth; and Mr. Grove's experiments have substantiated the fact that no force whatever can be evolved except at the expense of some other force. The new doctrine gave the word at which many other scientists commenced their labors, and proofs of the truth and importance of the Doctrine of the Correlation of Forces are coming before us daily. Mr. Grove further developed his views in another lecture, published in 1846. Among his many valuable and important discoveries are the gas voltaic battery, the striæ in the electrical discharge, the electricity of flame, the voltaic etching of daguerreotypes, the electro-chemical polarity of gases, new combinations of aplanatic object glasses of telescopes, and the monecular impressions by heat and electricity.

Although Mr. Grove's weak health formerly prevented him from following the arduous career of a popular advocate, as a lawyer he has achieved a high reputation for learning and forensic ability, and he has just received a fitting recognition to his talents by his elevation to the judical bench. To a philosopher of Mr. Grove's renown, the public honors and wealth are of little importance, and indeed, his acceptance of the judicial ermine will cause him to forego a lucrative practice, and take the moderate income of $25,000 a year. But the ease and dignity of the new position will enable the eminent recipient to prosecute further his investigations, and we have no reason to doubt that the world of knowledge and science will be greatly benefitted thereby.—*Scien. Am.*

THE Golden City and South Platte Railway and Telegraph Company has been organized in Golden City, Colorado, under a grant of the right of way to build a narrow-gauge road along the base of the mountains, and connect with the Denver and Rio Grande road at Littleton, ten miles southeast.

A PRACTICAL SUGGESTION ABOUT LABOR.

CLEVELAND, March 9, 1872.

To the Editor of the Journal of the Telegraph:

I have been observing the steady increase of the half rate, or red business, since the Company first commenced its operation, and am pretty clearly convinced that the manner in which it is now handled is not only an encroachment upon full rate business, but an unnecessary tax upon day operators. In large repeating offices day operators are obliged to perform a certain amount of hard labor during the early portion of the night, in order that half rates may be accommodated in common with full rates. This is wrong. I believe it was understood when the half rate system first commenced, that it should follow the *completion* of *all other business*, and which, probably, was done for a short time. But now much of the greater portion of our night commercial business is caused by the steady increase of half rates, not only with large offices, but with smaller ones, and not less than three-fourths of it is done between six and nine o'clock P. M.

This course necessitates the labor of a certain number of the day force every night, who report for duty at 7.30 and 8.00 A. M., consequently putting in about twelve hours' work against an average of seven hours for the regular night operators.

There is an easy remedy for this evil, which can be applied in very large repeating office, without detriment to half rates, and giving full rates their proper attention and promptness. Small offices, which close about 9 P. M., should be allowed to send and receive their half rates during the hours prior to closing of the same night, which would not be enough increase to interfere with full rates, or cause much increase in force. It would not make much difference if half rates, originating at smaller offices, were left over until the following morning, as they would be delivered about as soon as most all smaller offices are in direct communication with a large repeating office.

Large repeating offices should *not* be allowed to start a half rate before ten o'clock at least, and an hour later would serve the purpose better. By that hour the full rates are out of the way, and the regular night force is complete, as in most all large offices an extra operator or more comes on duty at about eleven o'clock. The half rates can thus be handled leisurely during the balance of the night by all large offices, and be forwarded to smaller ones early enough in the morning for all practicable purposes.

This arrangement would, of course, have to become general throughout the whole extent of the Company's lines to be effective, and work harmoniously. It would not do for New York to hold his half rates until 11 P. M. and let Chicago send his at any time after 6 P. M. This plan seems feasible, and discriminates not only in favor of full rates against half rates, which is certainly just, as no person will argue but that full rates have preference in all cases and at all times, but in a certain degree dispenses with the extra service of day operators at night. In writing up this article, I do not wish to be understood as being partial to one class of operators more than another, my only object being to facilitate the full and half-rate business of the Company, in doing which it places the two branches of business in their proper spheres, and makes an immense amount of labor now performed by day operators unnecessary without doing injustice to regular night operators. It is to be hoped that these suggestions will receive proper consideration. "S."

A SUPERINTENDENT'S OPINION.

TOLEDO, March 8th, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—The President having invited an expression of views as to the probable effect and working of the new tariff of State rates, I beg leave to give in my testimony on the subject so far as my experience in the service since 1855 will bear me out. I do not expect to surprise you with any new discovery, or extraordinary and brilliant ideas in relation to the tariff system, but merely corroborate the opinions and statements of a host of others, from whom, no doubt, you will hear on this same subject.

What is the effect to increase or lower the rates? It is plain that the public generally pay but little attention to slight changes in tariff, only where you have competition. With the bulk of the business, especially between important points, it is more a question of time than money. A route that can give the safest and quickest transportation and maintain itself, will eventually take most of the business. If you meet competition successfully, you must carry as cheap and as prompt as the opposition.

What are the evils of the present tariff? Most any system of tariff you may adopt will be understood and successfully carried out by managers of large offices, but it is a notorious fact that nine-tenths of the Western Union offices do not obey instructions given from time to time relating to the old tariff. When you consider the manner in which the Western Union business is handled on most lines throughout the country, and the numerous changes occurring at offices, you can readily see that it is impossible to first educate and then get managers to carry out your instructions. A large proportion of the check errors arise from this cause, together with imperfections in the rates when first issued. I am satisfied that this evil is magnifying, and results in great loss to the company.

It is evident that the new State rates will in the end increase the earnings; for comparison shows that between points where the bulk of the business is now done, the old rates will be maintained, but between distant non-competiting points, with some exceptions, the new rates are higher and will go into effect, and I cannot see that the reduction in local rates will overbalance, or even equal the increase in earnings on business between distant points. As the country develops the business between distant points will, of course, rapidly increase. The sooner a uni-

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form tariff is adopted the better, and I know of no plan that will work so smoothly, less liable to create errors, and so easily comprehended by the offices and the public generally, as the new plan proposed, but I should suggest reducing the new rates twenty per cent. and then cut loose entirely from the old tariff, so far as the rates between Western Union offices are concerned. You will be obliged, of course, to maintain special rates between competing points, and preserve the old record of other line rates. The use of the *asterisks* will, I fear, work mischief.

Very truly yours,

G. A. Beach, Sup't.

PRAYER BY TELEGRAPH.

"Vidi," the distinguished New York correspondent, says:

The prayer meeting in Fulton street is a sensitive barometer of the religious world of the United States. The attendance has increased quite fifty per cent. since the first of February, and the exercises are marked by uncommon zest. Daily instances of awakening conversion occur among persons present. Reports of new revivals and conversions are sent in daily from churches in different parts of the country from which had previously come requests for prayer. A number of new daily union prayer meetings send greetings, and desire prayer for their permanence. I looked in the other day at 12:55 o'clock (the hour for closing), as a gentlemon rose, saying: I, too, am from the West; and I want to tell you of something I lately witnessed there that has thrilled my heart. During the late convention of Young Men's Christian Associations in Zanesville, Ohio, daily dispatches were passing by telepraph between associations in different parts of the country and the convention.

An operator at Zanesville, who received and transmitted the messages, was invited to the devotional meeting, and carelessly consented to go in. It was but a few minutes before he was seized with the conviction that he was a sinner, and rose to ask prayer for himself. Before that meeting closed he rose again, and with great joy declared his faith in the Savior, saying that he felt as certain that God had forgiven his sins as that he stood there. Shortly after, a delegate, who had been to Zanesville, returned to Cincinnati and told the story. An operator in the Cincinnati office heard of it. He said to himself, "That's rather a sensational story, and I don't believe it." During an idle hour in the office it occurred to him to test the story. So he called Zanesville. Zanesville answered, and he asked the question: "Was an operator converted in the Christian Association Convention in your place the other day?" "Yes," was the answer, "and I am the man. Are you a Christian?" "No." "Then come with me to Christ. I want to pray with you. Will you kneel down now and pray for yourself while I pray for you?" "All right." Then, continued the speaker, they closed that telegraphic circuit, and opened one with heaven! God answered. The soul of that operator was converted, and the very next evening he went into the meeting of the Young Men's Christian Association, told his story and confessed his faith. Names, dates and references were given to vouch for this strange story, and as the speaker concluded another jumped up in a remote corner by the door and said: "I want to say one word!" The leader said "No," and was giving out the closing verse, but the stranger persisted, and said: "I can confirm every word of the story just told, for I was present myself at the telegraphic prayer meeting."

A TARIFF SUGGESTION.

To the Editor of the Journal of the Telegraph:

That a map be struck off, with merely names, States and towns, and tariff to be computed by measurement, say so much to the inch or fraction of same, using ordinary rule, or an instrument could be made for the purpose, the rate decreasing in proportion to the distance, which could be specified on the instrument. New offices could be located and inserted by stating (through the Journal) the distance by measurement on an air line between two offices already located. The map need not necessarily be large or costly—would hardly cost more than the book we have. Any dispute as to tariff could be readily decided by each Superintendent, as he could make the test and learn the rates between any two points given, which cannot well be done by the present.

Manager in Texas.

MINNESOTA.

St. Paul, Minn., Jan. 29, 1872.

To the Editor of the Journal of the Telegraph:

Dear Sir:—We seldom see an article in the Journal from our beautiful State, and begin to think it time it was brought to notice. We certainly deserve a small space occasionally in one of your interesting sheets.

This State is rapidly advancing in wealth and industry, and particularly in Telegraphs and Railroads. They now extend beyond the Red River of the North far into Dakota, are rapidly approaching the Missouri, and will soon penetrate into the last remaining hunting grounds of poor "Lo."

The flash of the electric telegraph, through the indomitable energy of the North Western Telegraph Co. also reaches into the North British possessions, and connects Fort Garry with their brethren in Canada.

St. Paul is destined to be the great centre of the telegraph and railroad systems of the North-West. We already have eight railroads centering here. Others are projected and under construction, eleven Telegraph lines diverging from here in all directions, and others to be built next Summer.

Our seasons are magnificent and wonderfully healing to the invalid in many cases. Occasionally hyperborian breaths on us a little cooler than is agreeable, but it is healthy, vigorous and bracing. The thermometer does not often go below 45; in such cases you want to keep up the steam to keep your pumps from freezing, if you get far away from the stove.

A great many persons East, have an idea our city is a one horse village, and that the people are principally half breeds and Indians. Those benighted beings had better come out if they want to see as substantial a city of nearly thirty thousand inhabitants as there is in the country, with as sharp business men, and as large business houses as are found any where. Another erroneous impression prevails that we are snowed in and frozen up, from October to June, we have just enough snow to make good sleighing, and our Spring is earlier than in many Eastern States.

The opposition line still lives, but judging from reports, it is rapidly declining up this way.

It is like a snake, the tail will wiggle a long time after the head is cut off. When the Duluth line was taken from them they lost their head.

Occasional.

The construction of the South Australian overland telegraph is proceeding rapidly and the line is now open eleven hundred miles from Adelaide.

OLD AND NEW CABLES.

The primitive cables do not appear to have been constructed with much attempt to proportion to any extent either their mechanical strength to the depth of water in which the cables were to be laid, effects of currents, &c., or the degree of insulation to the peculiar requirements of the line; nor, indeed, could the latter be affected, as is in the earlier attemps at cable manufacture and laying, the tests applied were of the crudest description. The fact that a message could be sent through the cable was considered a sufficient guarantee of its electrical soundness. It was due to these causes that such a large number of the earlier cables either never worked at all, or became inoperative in a very short time. The first attempt of any importance, at a refinement in cable manufacture, was made in the first Atlantic cable. Here, however, it was carried to too great an extent, and sufficient allowance was not made for the occurrence of any accident which might put an undue strain on the cable, such as would be caused by stormy weather, during the laying; neither were any steps taken to protect the cable from corrosion; so that on any attempt to raise it for repair, the rusted wire would give way, and the cable could not be raised to the surface of the sea. These difficulties have, to a great extent, been overcome, so that with the present system of paying out machinery, which works with almost clock work smoothness and accuracy, and the accurate and searching system of electrical tests, the manufacture and laying of a cable is of secondary interest, and excites but little public attention.

The cables now generally adopted are of two kinds. The first of these are very similar to those first constructed. They consist primarily, of "the core," which is constructed with various weights per mile of copper, and insulating material, according to the length and required working capacity of the line. The core is first served with a coating of hemp, tanned, to preserve it as far as possible from decay; this hemp acts as a padding for galvanized iron wires, which are laid on spirally around it. The whole is then coated with a second serving of hemp, which is covered with a silico-bituminous compound, laid on hot. This being pressed on by grooved rollers, gives the cable a smooth, round surface. In the second type of cable, the iron wires, before being laid on, are each of them, served separately with the coating of hemp, the outer serving being omitted. It is the latter type of cable which was used for the 1865 and 1866 Atlantic lines. In both types, the first serving is laid on wet, so that any fault which might occur in the insulation during manufacture, can immediately be detected and traced. The object of coating the iron wires with hemp, is to prevent any broken ends from projecting and catching in the paying out gear, an accident which would be certain to cause the fracture of the cable. Altogether, therefore, this last improvement is one of the most important that has been effected in the manufacture of cables. The idea of light cables; that is to say, cables with only a hemp or other light material sheathing, does not seem to have many advocates among the leading manufacturers and engineers; and it is doubtful, whether the public could ever be got to risk their capital in them. For, although undoubtedly cheaper in the manufacture, they are liable to turn out costly adventures. And is more doubtful since the present system of metal sheathing has been found to answer so well.—*Mechanic's Magazine.*

Mr. Cyrus W. Field sailed from Liverpool for New York on the 9th instant on the Cunard steamer Cuba.

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HUMORS OF THE TELEGRAPH.

We cannot withhold the following: A man under full steam is something to admire. This letter is in answer to a "caution" by Supt. Miller. It is very loud. Read it and stand from under. Now, Mr. McSweeney, fire away. Mr. Miller will meanwhile order his coffin.

To the Editor of the Journal of the Telegraph:

J. N. MILLER, *Superintendent, &c.*,

Chillicothe, Ohio.

My Dear Sir:—In the JOURNAL OF THE TELEGRAPH of the 15th inst., you stigmatized me as an "unprincipled telegrapher, unworthy of confidence."

You say I am "going the rounds practising impositions upon companies where I am unknown,—that I have recommendation from good parties, but of an old date." We will dissect this sentence now, and see how the account stands between us. Immediately upon my return last fall from Albany to Cincinnati, I applied to you for employment in the capacity of night operator, and stated that it *should* be at a county seat containing not less than five thousand inhabitants. You replied, stating that you had such a vacancy—sent me a pass, and I reached Chillicothe on the next subsequent train. I called at your gloomy sanctum, introduced myself, and submitted my letters for your approval. You expressed great satisfaction with my letters and my *physique*, and inquired why it was that a person of my acknowledged abilities should seek so insignificant a situation as I asked for. I told you I had been reading law for some two years; that I had just completed by legal education at Albany, and that owing to the depleted condition of my treasury, I would be obliged to return to telegraphing for a few months until I could accumulate enough money to rent and furnish an office, and "hang out my gold lettered sign." I also said I was not a first-class operator, hence my anxiety to secure a situation of comparative obscurity. You mentioned Athens as being the office then vacant; you represented it as being a place of some four or five thousand inhabitants, who were energetic and public spirited; as possessing good hotel accommodations; and as being an exact prototype of its Grecian namesake in her palmiest days. I left Chillicothe for "classic" Athens, on Monday morning, and upon reaching there, I discovered the telegraph office to be located in an abandoned cow shed, and a whiskey shop filled with blear-eyed, bloated and frenzied Athenians but a few paces off. This was rather an unpleasant introduction, but I concluded to waive those disagreeable features, provided the other representations you made proved to be true.

After scaling a lofty hill and reconnoitering for information, I learned that the place contained nearly fifteen hundred inhabitants, that owing to its great age it was rapidly crumbling into ruins, and that I could not secure board for less than two dollars per day, unless I slept on the "hurricane deck," and on the same mattress with a filthy and intemperate cordwainer. Discovering myself to be a victim of your premeditated duplicity, I concluded to retaliate by requesting you to assume the indebtedness I thus contracted, and return to Cincinnati at once; to this you consented, and because I have not recompensed you for your deception, I am denounced as being "unprincipled and unworthy of confidence." Saint Matthew tells us that if we are wronged by a friend, we must go to that friend and acquaint him of the injury privately; but you, an unhallowed pile of smoldering ashes, not only ignores the admonition of the venerable Apostle, but publicly denounce me for not performing an act that would be derogatory to law and repulsive to morals. Renegade, slave, coward, liar, slanderer, murderer of the Queen's English, hackwriter and policy spy, the one small service you could do me was to villify me, and such as you are may all my villifiers be.

Again, you say, "his sojourn with this company was one night received, and fearfully bulled one commercial messenger, struck out next day." It was Daniel O'Connel's exclusive prerogative to hurl a vigorous young brood of thoughts before the public without a tatter to cover their nudity; but it remains for you, a tottering monument of adnascent imbecility, to outstrip my illustrious countryman in assassinating her Majesty's English, and dressing your uncouth productions in habiliments fresh from the looms of your own meretricious imagination. I have struggled long and manfully against the twin vicissitudes of poverty and adversity, and have met many a scowl in my day,—I have traveled a good deal during the past six months, hoping I would eventually succeed in securing a situation favorable for the prosecution of my legal labors, but amid all my discouragements and during all my travels, I challenge you *or any one else* to point to a single spot contaminated by my footprints. You are one of these shivering imbeciles, who, like Goethe's scoffing fiend,

"Bleibt stets von Schlag,
Und ist so wunderlich als wie am ersten tago."

Another one of your choice innuendos, and I will have completed the unpleasant task of your infamy imperishable. You say "his *modus operandi* is to work for a few days, get possession of money enough to compensate services, and suddenly depart, leaving all debts unpaid." You will soon be called into court sir, to establish the truth of this accusation; until then I leave you to your own meditations, with the admonition, however, that if I again have occasion to meet you through the press, I will raise excrescences such as windgalls, spavins and fistula upon your emaciated carcass, that all the horse doctors in christendom cannot heal. But I must conclude, lest some cosmopolitan humanitarian should prosecute me for cruelty to animals.

Respectfully, &c.,

T. McSWEENEY.

BLOOMINGTON, ILL., March 1st, 1872.

Aint that Dutch terrible! Mr. Miller is not a member of the Insurance Association.

ELECTRO-MAGNETIC WATCH-CLOCK.

We all remember the remark of Coleridge in reference to the river Rhine: "The Rhine," said he, "washes Cologne; but what power shall wash the Rhine?" So it is easy to hire watchmen; but whom shall we get to watch them, and see that they do their duty? Fortunately, science has not left us without assistance in this matter; and tell-tale clocks, and other mechanical contrivances, enable us to tell, without a possibility of mistake, whether or not a watchman has done his duty. The Hamblet clock may be placed in the office, or in a separate building at a distance from the premises to be guarded. A system of wires radiates from the clock to all the buildings and premises, and to the points which it is desirable for the watchman to visit in his tour of duty. At each point, or station, the watchman inserts and turns a key, or simply touches a knob, which causes the electric current to pass and do its work upon the magnet at the clock, and produces a penciled record on a paper dial at the exact instant when the key is turned. The watchman in this manner, passing around from station to station, successively, makes telegraphically his own record of duty done, showing the time of each visit to each station, as well as the time occupied between the stations; and of course the whole time taken up in making the entire round, and also in going all the rounds; and, if all the stations have been visited or have been neglected, the facts will be shown upon the dial. In fact, the superintendent can read in the morning the exact part of the premises at which the watchman was at any minute of his required tour of duty during the night. The paper record-dials are changed daily, and may be filed and kept as a permanent record of the watch duty, interesting to insurers; being a time-record made by the watchman himself, and which he can make in no way except by visiting the stations in regular order. The clock can be constructed to combine the recording instruments of a number of watchmen in the same case; they have been set up for eight and ten watchmen in one clock. The clock has a sixteen-inch time-dial, with full-length seconds pendulum, dead-beat escapement, and maintaining power. The case is seven feet four inches high, twenty-four inches wide, with recording instruments for two watchmen. It is the invention of Mr. J. Hamblet, Jr., who is associated with the firm of Messrs. E. Howard & Co., of Boston, Mass., and is very ingenious and perfectly reliable.

PATENTS.

TELEGRAPH PRINTING APPARATUS.—Henry Van Hoevenbergh, of New York city.—This invention has for its object to produce a simple and convenient mechanism for reversing the motion of the type wheel of a telegraph printing instrument. It is intended for use more particularly on an instrument for telegraphing stock quotations, etc., where it is desirable to have a reversible type wheel, and thereby avoid frequent necessity of making almost complete revolutions to reach types that may be brought to action by a short back movement. The invention consists in a new revolving gear actuated by a separate current through an independent wire, and in a new double pawl mechanism for actuating the type wheel shaft. The invention also consists in the application to the latter of a stop whereby its motion is arrested, if and as long as it is not in concert with the other instruments that are operated simultaneously by the same keys.

ELECTRO-MAGNETIC ENGINE.—Claude Victor Gaume, Williamsburg, N. Y.—This invention has for its object to furnish an improved electro-magnetic engine, simple in construction and effective and reliable in operation, being so constructed as to be free from the "pull back" or retardation which is a great objection to such engines as usually constructed. The armatures consist of a central bar, attached at its center to the face of a wheel, and having cross heads formed upon them about midway between their centers and end, the cross heads having short bars formed upon their ends parallel with the central bar, and the ends of which project to equal distances upon the outer and inner sides of said cross heads. Armatures thus constructed are claimed to be free from the retardation or "pull back" which was the great difficulty to be overcome in making electro-magnetic engines practical as a motive power.

ELECTRO-MAGNETIC ENGINE.—Henry S. Daggett, of Lafayette, Ind.—This invention relates to a new arrangement of stationery magnets and vibrating conductors, and to a new combination of the same with a sliding piston rod and vibrating link movement, whereby a complete electric engine is produced, imparting a reciprocating motion to the piston and other suitable action to the mechanism connected therewith. Magnets arranged in rows and connected with wires and pendant chains, a piston provided with a swivel lever which moves under the chains and thereby produces successive connections with the several rows of magnets, stops affixed to the frame for swinging the lever at the end of every stroke, and thereby reversing the motion of the engine, and an electric engine consisting of frame rack, magnets, wires, chains, piston, lever, and stops, all combined to operate as described, are the features upon which a patent has been obtained.

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FAMILIAR TELEGRAPH TALK.

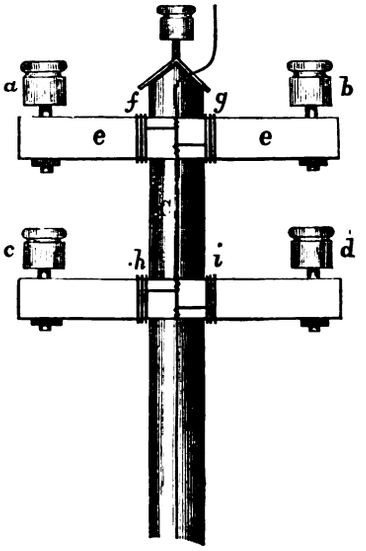
A correspondent asks in reference to what we said about the use of glass knobs for interrupting the main wire in front of office, "Will common glass insulators answer the purpose?"

There is a certain sense in which many things may be used to accomplish the same purpose, and an ordinary glass insulator, by punching out the head, and putting one wire through it and another across it, will, no doubt "answer." There used to be made, however, a knob of very pure glass, for this very purpose, which, with a troublesome eye like ours, we would greatly prefer. It had a thickness of 1¾ inches, full round edges of equal diameter, and a centre groove for one of the wires. The other passed through a central transverse hole. Its only advantage lay in the purity and smoothness of the glass, and in its neatness, which latter quality, we think, should never be despised.

With this digression, we add another. The discharge of lightning is, as all know, accomplished by having the office wires pass, on the "cut out," a knob of brass connected with the earth. There is no doubt that this plan is effective to a degree, convenient, and, generally, safe; yet, we have always entertained the opinion, that if a carefully planted ground wire could be applied to a pole a short distance from the office, one on either side, it would be a great advantage. Of course, it would require care. What good result is ever accomplished without it? A small box could easily be made in connection with an insulator, into which the ground wire could enter, and, being fixed to a neighboring pole, by shutting off the maximum of a lightning charge, would give the interior shunt less to do, and thus more perfectly preserve the magnet from injury, or the plan of the annexed cut might, if the wire was isolated from the pole, be adapted.

The plan adopted in England for carrying off the inductive currents, of which Mr. Varley gave us the accompanying cut and which is now being employed by Superintendent Tubs and others, to protect our prairie structures from destruction from lightning, would, of course, be effective in the matter we propose. It would save the occasional burning of office connections, and the setting on fire of office windows, of which we have sometimes heard, and would preserve the integrity of many an injured magnet core. We think if we were manager of a way office we would avail of every means of keeping our office in prime order. But we counsel every one against carrying out such an idea as last named on his own hook. We are merely taking an operator's privilege of saying things as they occur to us, and these may form the subject of a conversation between an operator and his superintendent, which may lead to knowledge of a purer and better kind.

We think we were the first to devise a mode of discharging lightning from an office, and for which we received a very flattering notice from the Hon. Amos Kendall, in the Washington *Globe*, sometime in 1846, and the presentation of a silver medal by the Philadelphia Franklin Institute. It was done by using a magnet of coarse wire, similar to a sounder, between the line and the relay. The line wire was connected to the arm of the armature; and the wire which led to the relay was connected to a post on which the end of the armature arm opposite the magnet was made to rest by a spring which detained it. The post back of the magnet had a ground connection. This magnet was adjusted so that the ordinary current did not affect it. When, however, a lightning current passed, the magnet drew down the arm and discharged the dangerous current at the ground post. This was thought quite an achievement in these early days, and we were correspondingly elated by our success. It looked very handsome on the table, and we gave it all possible honor. But not long after, when a brave youth stuck a piece of paper round the gas pipe and made the main wire pass round it, thus discharging all Jupiter's thunderbolts in this very vulgar way, we put our medal away, and took our magnet home never to use it again. It was a short-lived glory that, but was good while it lasted. Not long after this, Gen. Stager conceived the idea that a pointed permanent magnet, brought near the main wire, would be a sensitive arrester of these sky currents, but the gas pipe prevailed until regular arresters of different forms were made part of the office machinery. The history of these, their many forms, plates locked together with a separating paper, wire brushes in proximity, platina points shooting at each other, charcoal beds, might be curious, but too long. It was one of the points on which genius exuded freely, and of which we should not complain having set the example. We think we should have passed the silver medal to the gas pipe man, but we were human and didn't. The come down was too great. It was the sublime upset by the ridiculous; yet the ridiculous won.



The casualties by lightning entering offices have been rare, yet were regarded at one time as alarming. The first occurred at Greensburg, Pa., in 1848, when the window sash caught fire, and caused much apprehension. At Zanesville, O., a few years later, all the wires were fused as in a furnace. A few similar cases have occurred, but all apprehension has long ceased, and the wires are looked upon with a friendly eye as protectors, although one good farmer's wife insisted that her best cow was dried up because, while being milked one day, she stood against a telegraph post. In England, no doubt, that cow would have been examined by some electric expert and reported upon, but it remains an open question to-day, "was that cow dried up by leaning against that pole and why?"

One day in 1846, while engaged in building the lines in Pennsylvania, as we sat by the side of the Columbia Railroad with our men, eating our frugal noon meal of milk and bread, a fine bull calf came strolling around, looking at us, and apparently not at all displeased with our looks or mode of living. It was a warm summer day, and we had had sundry atmospheric shocks from the wire as we strung it on the poles. Near where we sat, the new wire we were erecting hung from a pole to within four or five feet of the ground. To this, the enquiring calf betook itself, and, as many a man has done, touched it with its tongue, when, with a loud and disgusted baa, and with a tail like a disgusted ramrod lifted up on high, the young bull leaped the nearest fence, quite satisfied with his electric experience, yet in no way anxious for more. The way he went over the rail fence was almost æronautic, and decidedly bully. From this juvenile bull may be learned how dangerous it is to kiss the wires in summer time, and to what relays are subject when due care is not taken to give them protection of the most perfect kind. These flashes are hammer strokes hardening magnet coils.

CHECK ERRORS.

To the Editor of the Journal of the Telegraph:

DEAR SIR: Please give your decision. If I receive a message from a distant office signed by a transient party say to forward his trunk, requiring an answer. I send answer to collect, but check is changed in transmission by a repeating office and message is received paid. In due time comes the error sheet. The transient party has gone. Now, who is to pay, or whose error is it? The Company will have the money; I am told to get the other office to collect, and in case he can't collect I am to forward the amount. Can this be right? Yours truly,

MANAGER X.

When an error of the kind indicated is made, there being no record to prove the contrary, the presumption is against the sender. Hence the directions given. The appeal then must be to the Superintendent, who will do justice in the case, and permit a charge of "refunded," when made clear to him. These, however, are questions of management and routine, which are left to the discretion of Superintendents, and the mode of deciding which must often bring into use arbitrary rules and exceptionally incorrect decisions, so far as due performance of duty is concerned.

In the case you name it seems that the message must have had its payment provided for as an answer for a transient party, before the original was forwarded as required by the rules. This might have led to a detection of the error made against you. Yet we cannot see how the check department could act in any other way than it has.

HOLLY SPRINGS, MISS., March 5th, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR: Please decide following controversy between this office and Jackson, Miss. I say that according to Rule Nine, Third Paragraph, United States Hotel, United States Attorney, United States Marshal, are each counted three words. Jackson says the first is three, but the last two are only two words each. Please let us hear your opinion through the JOURNAL. Very truly yours, HOLLY SPRINGS, MISS.

ANSWER.—Jackson is right. "United States" according to Rule Nine, First Paragraph, is one word when used to designate the nation or officer thereof. "United States Hotel" is distinctly given in the Book of Rules as three words, as United States there has no national significance, has no national reference.

TRAIN ORDERS.

SOUTHERN KANSAS, March 1, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR: In No. 103 of the JOURNAL I notice an article, written by "A.," of Jacksonville, Ill., in regard to train orders. He thinks the following order is correct, which *is*, as far as it goes. He has only partially corrected "Green Flag." Both trains can be embraced in one order, as A. claims, viz: "To Conductors and Engineers Nos. 1 and 2. Trains Nos. 1 and 2 will meet at A." To make the order complete in the above it should be. "To Conductors and Engineers Nos. 1 and 2: Trains Nos. 1 and 2 will meet *and pass* at A." In A.'s order it does not mention pass, although common sense teaches us that they should and will pass, but *meet and pass* should be in an order to make it complete.

Yours fraternally, M.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY.

PREPARED BY EDWARD C. COCKEY, ESQ.

Appointments—Operators.

Miss Ida Baker.....City Department, New York.
J. C. Bell.....Gen'l Operat'g Dept., New York.
C. E. Burroughs..... " " "
G. Irving.....Thirtieth Street, New York.
J. F. Knapp.....Gen'l Operat'g Dept., New York.
M. Labaugh..... " " "
J. M. Moffatt..... " " "
Miss Lizzie T. Moore.....City Department, New York.
J. J. O'Connor.....Gen'l Operat'g Dept., New York.
J. F. Olmstead..... " " "
Geo. H. Trueman.....Apohaqui, N. B.
P. E. Seely.....Enneskillen, N. B.
Miss Bessie Graham.....Tracadie, N. S.
Miss Sara W. Sweetser.....Exeter, N. H.
Miss F. B. Field.....Farmington, Me.
Warren L. Pushaw.....Pittsfield, Me.
W. L. Libby.....Auburn, Me.
Cyrus Gaze.....Barton Landing, Vt.
C. L. Newell.....Hillsboro' Bridge, N. H.
Miss N. M. Freeman.....Hoosick Falls, N. Y.
H. L. White.....Leicester Junction, Vt.
P. E. Brown.....North Pownal, Vt.
Miss N. B Hawkes.....Waltham, Mass.
Miss M. P. Austin.....Auburndale, Mass.
Miss M. E. Hill.....Boston Highlands, Mass.
M. O. Morgan.....Mittineague, Mass.
Miss F. Miller.....New Haven, Conn.
Miss A. E. Rogers..... " "
Geo. H. Bancroft.....Warren, Mass.
A. R. Hunt.....Weymouth, Mass.
M. V. B. Watson.....West Chester, N. Y.
Jas. Cunningham.....Waterbury, Conn.
John E. Tallman.....Montrose, N. Y.
A. M. Trackenburg.....Baltimore, Md.
A D. Wilt.....Centre Valley, Pa.
W. L. Ruth.....Clearfield, Pa.
J. C. Crossen.....Fort Washington, Pa.
M. S. Beaver.....Lansdale, Pa.
Miss J. Higbee.....Leeds Point, N. J.
Wm. A. Clark.....Northumberland, Pa.
W. B. Conard.....Old York Road, Pa.
A. Hesser.....Pottsville, Pa.
Frank A. Eastman.....Philadelphia, Pa.
Jos. Christy..... " "
Rufus Yerkes..... " "
C. Hellixer.....Washington, D. C.
Jos. A. Kerbey..... " "
Lewis Klotz..... " "
J. C. Landis.....Souders, Pa.
E. K. Wambold.....Sellersville, Pa.
Jos. K. Simpson.....Scranton, Pa.
Wm. Blackham.....Binghamton, N. Y.
W. W. Campbell.....Hannington, W. Va.

Resignations—Operators.

E. H. Brown.....New York Hotel, New York.
H. T. Brown.....Thirtieth Street, New York.
J. A. Cameron..... " "
Miss Florence Colyer.....City Department, New York.
G. H. Cook. .....Gen'l Operat'g Dept., New York.
J. Doody..... " " "
Miss Mary E. Forrest.....City Department, New York.
J. A. Macdonald.....Gen'l Operat'g Dept, New York.
John Power.....Canal Street, New York.
H. J. McCormick.....Gen'l Operat'g Dept., New York.
J. S. Risley..... " " "
J. F. Sinclair..... " " "
Wm. McAfee.....Fairville, N. S.
E. A. Leonard.....Apohaqui, N. S.
Miss K. B. Randall.....Farmington, Me.
Miss M. A. Watson.....Exeter, N. H.
W. H. Story.....Hillsboro' Bridge, N. H.
F. H. Estabrook.....Hoosick Falls, N. Y.
T. R. Miller.....North Pownal, Vt.
H. Keyes.....Waltham, Mass.
N. B. Chadsey.....Warren, Mass.
D. V. Poole.....Weymouth, Mass.
N. T. Chase.....Montrose, N. Y.
E. H. Crawford.....Liverpool, N. Y.
Wm. C. Woolson.....Niagara Falls, N. Y.
Joseph Atchison.....Oswego, N. Y.
B. Williamson..... " "
James W. English.....Rochester, N. Y.
Chas. J. Shay.....Washington, D. C.
Wm. S. Logue.....Baltimore, Md.
I. I. Riegel. .....Centre Valley, Pa.
A. C. Jones.....Northumberland, Pa.
Jno. A. McKenna.....Philadelphia, Pa.
W. W. Shannon.....Scranton, Pa.
Jno. M. Moffatt..... " "
Wm. E. Dulin.....Washington, D. C.
D. Marean..... " "

EXPERIENCE is a good teacher, and when a man working at his trade, invents anything by which to facilitate or improve his labor it has the assurance of a practical value. We have just been called upon by Mr. David Emminger, a practical telegraph repairer from Harrisburg, Pa., where we first commenced our telegraphic career, with a glass insulator of what strikes us as an improved form, and with a novel addition to it. The insulator is 4½ inches long, diameter 1¼ inches at top and 3 inches at the edge of the bowl or water drip. The peculiarity of the form is, that the sides are perfectly straight from the top to the water drip, by which the rain runs readily off and perfectly cleanses the glass. This was proven by an insulator taken from the line which on its upper slope was clean, but on its lower and perpendicular side was coated with the smoke deposit from passing cars.

The chief feature of the insulator however is that about an inch and a half from the top four triangular glass lugs are formed on the cylinder, with a slot in each for the reception of the wire. On two of these the main wire rests, touching only the edges of the two lugs, and the binding wire the other two. Thus the bearing of the wire on the glass is reduced as in the Chester insulator to a minimum, but without the use of a metallic yoke as in the Chester.

AMONG the changes taking place in the Executive force of the Central Division of the Western Union Telegraph Company, we notice the retirement of D. H. Ogden, Superintendent of the lines on the Sioux City and Pacific Railroad, and the appointment of E. D. Titus to the post thus made vacant. Mr. Ogden has been a good and efficient officer and enters pursuits of greater promise of remuneration. Mr. Titus, we are assured, is a fit successor, a careful and capable and energetic man. The telegraphic interests of the West are daily assuming vaster proportions, and men of prime executive ability are needed for its development and care. The present condition of the Western management reflects the highest credit on Mr. J. J. S. Wilson, Superintendent at Chicago, on whom it largely depends, under General Stager's eye, for its vigor and character.

REDS.

To the Editor of the Journal of the Telegraph:

Please give your decision upon following case:

A man, or firm, buying and selling considerable grain, seed, &c., by telegraph, comes into telegraph office at seven o'clock P. M., asks if there is a telegram there for him, is answered in the affirmative, and has a red message from New York handed to him, quoting late markets. Has he the right to answer the same by red message that night. If not, and he refuses to reply by full rate, can the W. U. Co. be held responsible for any loss that he may sustain thereby?

Again, after receiving his red message from New York, has he the right to buy or sell articles of the same kind at some other point, by using red blanks that night? If he has not the privilege of replying to a red message, with a red the same night, or cannot use red in buying or selling on the same, what authority then have we for delivering the same to him, on the date of receipt of the same, even if called for at the counter?

ANSWER.—You started wrong. The red message should not have been delivered until morning. That answers all the rest.

RAILROAD ITEMS.

Mansfield, Coldwater & Lake Michigan.

The entire portion of this line in Ohio, except about twenty miles, is graded, and two weeks of good weather will suffice to complete the work. On the Michigan end, eighty miles are graded and tied with only eight to grade, and early in the season the entire line will be in operation, giving unbroken rail communication with Muskegon.

Canada, Michigan & Chicago.

The Company proposes to build a railroad from St. Clair to Lansing, to be operated in connection with the Peninsular Railroad.

Louisville & Cincinnati.

A charter has been granted for and work has been commenced on a narrow-gauge railroad from Louisville up the Ohio to Westport, and efforts are making to secure a charter which will complete the line along the river to Covington and Cincinnati.

Lake Erie & Louisville.

This Company, it is reported, has closed a contract for the construction and equipment of its line from its present southern terminus at Findlay, Ohio, southwest through Lima and St. Mary's, Ohio, and Union, Ind., to Cambridge, Ind., 1,500 tons of iron to be delivered May 1, or as soon as navigation opens; an equal amount June 1, and 2,000 tons July 1, which will complete the road to St. Mary's, Ohio, 52 miles, and the remainder for the whole line as fast as it can be used. There is now 37 miles of the road in operation, from Fremont to Findlay. The completed line would be almost an air line from Sandusky to Louisville.

East Line & Red River.

This Texas company, recently organized in Jefferson, is preparing to construct a railroad from Jefferson northwest to the Red River near Sherman, Texas, a distance of about 150 miles.

THE Dominion Telegraph Company, of Canada, report its ownership of one thousand one hundred and seventy-six miles of line, bearing two thousand two hundred and sixty-five miles of wire. It reports also eighty-three offices opened in the Province of Ontario. Issued capital, $270,000. A dividend at the rate of five per cent. on paid-up stock was paid in December, on the business of the eighteen months preceding. The lines of the People's Telegraph Company in the province of Quebec have been purchased, adding three hundred and thirty-four miles of poles and six hundred and sixty eight miles of wire to the property of the Company. The United States connections of the D. T. Co. are with the Atlantic and Pacific Telegraph Company, and are based on an agreement for twenty years from April last.

THE *Evening Post* announces the introduction of a new stock and gold printer, the invention of Mr. Robert H. Gallaher. There is a curious sentence in the rather curious article which announces this last scientific wonder, which is peculiar. It says: "In the opinion of many, the Callahan instrument falls short of what is needed, as it does not keep up with the fluctuations of the stock market during exciting times." We think this must have been written by the same pen which announced the remarkable heating of the wires on "Black Friday." The peculiarity of the new printer seems to be in that, instead of an alphabet wheel, by which announcements are compared, the names of certain stocks are set on the type wheel, so as to be struck off at once when quoted. This is a device simply to get round the existing system, and while it obtains a slight advantage apparently, loses the power of general telegraphic employment.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JAMES D. REID, Editor,
Executive Rooms, Western Union Tel. Co.,
145 Broadway, New York.

NEW YORK, MARCH 15, 1872.

SPRING DUTIES.

As Spring opens, of course the active out-door telegraph work will be resumed with new vigor, and, we trust, under the stimulus of a higher knowledge of the necessities of the business. We refer now specially to that part of the labor of the lines, which fall upon the men engaged in repairs.

We shall, for example, soon have upon us the usual Spring rains, as well as the usual plethora of business which attends the opening of navigation, and the commencement of Spring trade. The lines are now working splendidly, because the weather is clear, sharp, and there is no demand upon the insulation. But the moment rain falls, then, every broken glass, every bare bracket, every string hanging across the wires, reveal their capacity to interfere with the office work. This is, therefore, the time when every repairer should be sent out with the special duty of supplying every broken glass, no matter how slightly diminished by breakage, with a new one, and removing every obstruction of every kind. It was only a few days ago, we took up our old duty for a few minutes as we were hurried along in a lightning train to look up at the lines. Generally, everything was in perfect order. But, just as we neared a small wooding station, we found the upper wire entirely without insulation on two poles, and the glasses badly broken on five more. Of course that wire will be more or less useless when the rain comes. We believe that it would pay managers of offices to inspect personally the wires along the routes on either side of them, and they owe it to themselves to insist on a complete insulation of that part of the structure which affects their office work. We say this without any desire to reflect on the repairing force.

One great error is a most common one. A repairer imagines that if a glass is merely fractured, so that a part of the bowl is gone, while the part around the pin remains perfect, that no change is necessary. Thus it is that thousands of broken lipped glasses remain upon the poles in all directions. Now this is a fault which should be ended. No broken glass should be allowed to remain a day after its discovery, and no labor is more profitable than that which preserves the insulation complete. Are we presumptuous in saying all this? Are you all ready for the rain?

A NEW BLADE OF GRASS.

The saying is trite that he who makes two blades of grass to grow instead of one, is a public benefactor. We suppose this is true only if the grass be good, and grass be desirable. If all flesh is grass, and the good book says it is, we think that one blade of that kind is sometimes as much as this world can stand, and some blades flourish entirely too long for the happiness of the world and the rest of mankind. We have no one specially in mind at this writing, so no one need to feel bad about it. When, however, it does really happen that a man of creative talent increases the richness of the verdure of the fields, and man and beast obtain thereby a new chance to live and a new help to labor, there is not a bird above nor a fish below but should, each in its own way, sing a psalm of thanksgiving. And so should we.

One of the wildest propositions, to our thinking, used to be the idea of using a wire for the double purpose of, simultaneously, transmitting and receiving messages; in other words, of writing both ways, on the same wire, at the same time. We had been assured of its use on the Continent, and non-experts—that is, people generally—were only troubled about the way the switch could be managed, so as to allow the messages to pass each other, they regarding a wire much as a single-track railroad. But we could not, and we say it honestly, see how such a thing could be. We fear that we gave too little credit to the possibilities of human invention then, just as we are likely chargeable now with giving too much. On the continent, however, by more than one process, yet with limited success, has this apparently paradoxical feat been long since accomplished. It has not been so successful, however, as to have come into any considerable employment, or attracted special attention.

By certain improvements, however, in the combination of the transmitting apparatus, Mr. J. B. Stearns, of Boston, has succeeded, in so marked a measure, in accomplishing this very valuable result, that its introduction as a feature of American telegraphy seems, to say the least, probable. It has been tested on circuits of different lengths, and, we believe, through repeaters, to distant points, with promising success. It is thus made apparently possible to double the capacity of every wire. Here is an element of profound worth. It is of simple application. It involves no expensive machinery. It requires no unusual talent to work it. The Western Union Telegraph Co. are giving it a fair trial. We shall be glad if it prove an entire success on the long circuits which our far separated, yet actively connected, commercial centres require. And we shall be glad to crown the quiet and unassuming man, who belies his name by the gentleness of his manners, as the benefactor who has given us a veritable "new blade of grass."

THE French Atlantic Cable Company have purchased the contract for a new Atlantic cable announced to have been made by Messrs. Bischoffheim and Goldsmith with the Telegraph Construction and Maintenance Company, and will prepare for a speedy laying of a fourth cable between England and New York direct, to be worked in the interest of the existing companies.

PERSONAL.

We are doubtful of the propriety of publishing any of the many kind letters of which we have lately been the recipient. They can, however, hurt none but the one to whom they are addressed, and that only by the possible charge of indelicacy to which their publication may make him liable. The two following letters are too valuable to keep to ourselves. We wish all to enjoy the pleasure they have afforded us. In Mr. Orton's letter will be found a tone of tenderness such as seldom comes from the Executive of a company to a retiring subordinate, and which we fear in our case is not wholly deserved. We read it in tears and rejoice in its possession. It cannot fail, we think, to attach to him, more closely than ever before, the whole staff of men, who, over this whole continent, serve under his administration. To him, we may be permitted now to say, we have been drawn from the first by an instinctive devotion, which deserves no name which expresses less than personal love. The pang we feel in sundering ourselves from the service of the telegraph, which, God knows, is strong enough, is not half so keen as that which separates us from him. We need not say that we are only too happy to continue to serve the JOURNAL until May, and even thereafter in any way in which we can usefully supply a word to its columns.

FROM PRESIDENT ORTON.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH CO.,
NEW YORK, March 1, 1872.

James D. Reid, Esq.:

MY DEAR SIR: * * * * * *

I have never forgotten the pleasant intercourse of the few months succeeding our connection with the United States Company. I was an ardent pupil and you a cheerful and patient teacher. I have not forgotten your prophecy, made long before indications were visible to me, even of the first step, that, some day, all the telegraph lines on the Continent would be consolidated, and that I would be at the head of their control. Your prophecy has been fully realized within the period of which you speak. I should be ungrateful, indeed, to feel otherwise than kindly towards one who, knowing me but little, predicted for me so brilliant a success, so honorable a career. To achieve that success has involved labor and study to an extent that left me no leisure for social amenities, nor for other than the briefest personal intercourse. The experience in the telegraph which you have been a quarter of a century in acquiring, I have endeavored to concentrate within five years, and at the same time to discharge the new duties which have been imposed upon me. If I have ever appeared to neglect you, it was because my thoughts were intent upon a business which has had all my time, all my abilities, and almost my life. Your apparent respect—more, your evident friendship—has always been grateful to me, and it grieves me to think that I may have been so unfortunate as to have failed to give evidence that these sentiments were heartily and entirely reciprocated. I hope never to climb so high as to get beyond the reach of the friendly hands and kindly voices which have aided and cheered me on.

I designed to have stated to you some time ago, what was true then, and is truer now: *You have done well.* The JOURNAL has more than realized any expectations I dared entertain of its usefulness when established. And now I fully comprehend your need of rest. I realize also the advantages which a new sphere of duty may offer you. If you can secure both of these in the field you propose to enter, I shall not regret the loss which the telegraph will sustain. It would, however, oblige me much if you would continue to look after the JOURNAL until May first.

Although the paths we have pursued, respectively, during the last six years, seem about to diverge, perhaps never again to come together, I shall feel always a warm interest in whatever concerns you.

It should be some gratification to carry with you into the new field of effort on which you propose to enter the consciousness that the labors you have bestowed upon the telegraph have borne, and will continue to bear, abundant fruit. Your life has been a continual exhortation to industry, temperance, and frugality, and thousands have been made better by the influence of your example.

That God will bless you, my friend, and give you at the last "that peace which passeth all understanding," and which is the complete and only compensation for a faithful life, is my hope and prayer.

Sincerely, your friend,

WILLIAM ORTON.

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We add the following welcome note from Professor Morse. We are not aware of any special kindness we have shown to him. We joined with the thousands of our comrades in doing him a deserved honor. Yet we confess the power of a personal attachment to him and the heating of our blood when his rights have been questioned. So we are very grateful for his recognition of us. We have worked in the trenches long and lovingly. The recognition of such men is honor enough under which to close the campaign.

FROM PROFESSOR MORSE.

5 West 22d Street, Feb. 28, 1872.

My Dear Friend Reid: I perceive by your last Journal of the Telegraph that you are about to retire from the editor's chair. I truly felt saddened at this announcement, for in my long and intimate acquaintance with you I have ever found you a conscientious as well as an intelligent man, and one who deserves the respect of all who value honor and integrity. Your personal kindness to me demands some recognition, and I ask your acceptance, therefore, of the accompanying articles as a slight token of my personal esteem. I can present them to you now, on your retirement from your position, without incurring the suspicion of other motives than those I have professed, which are those of the highest personal respect, and the sincerest wish that your future career may be one of profit and honor. Sincerely, your old friend,

Samuel F. B. Morse.

Accompanying this note were several articles of table silver service, which we highly prize.

TRANSFER SERVICE.

Newcastle, Pa. office has been transferred from E. P. Wright's district to C. O. Rowe's district.

Pittsburgh, Pa. has been added to the list of "*offices specially authorized.*" I. O. Hendrickson, Agent.

Executive Office,
Western Union Telegraph Company,
New York, March 16th, 1872.

Executive Order No. 138.

Hereafter all complaints of error or delay in the transmission of cable messages, and applications for refunding on the same, should be accompanied by the original copy of the message as delivered in Great Britain or on the Continent. WILLIAM ORTON, President.

Pope's Modern Practice of the Telegraph, enlarged edition, we state again, in answer to several enquiries, is a most excellent and carefully prepared text-book, and such as must commend itself to all telegraph students. Mr. Van Nostrand, Publisher, has left copies in our hands for prompt mailing, and on receipt of the published price, two dollars, it will be mailed, post-paid.

The Western Union Telegraph Company has purchased the large property situated on the northwest corner of Dey street and Broadway, to be the site of a new and enormous headquarters. An attempt was made, in the first instance, to buy the Astor House for this purpose, in order to bring the headquarters of telegraphy on this Continent as close as possible to the post office. This attempt, however, was a failure. The Company then made a bid for the estate situated on Dey street. This property extends between fifty and sixty feet on Broadway, and runs to a depth of one hundred and fifty feet on Dey street. It was originally purchased by Dr. Evans, the American dentist at the late Court of France, for $480,000, in behalf of Louis Napoleon. The ex-Emperor sold it to the Western Union Company, through Dr. Evans, for $850,000, thus netting the nice little margin of $370,000 for himself. The property will be assumed by the first of May, after which all the buildings at present there located will be torn down to make room for an enormous and elegant structure, which will be the headquarters of the Company —*N. Y. Times.*

This does not look much like selling out to the Government.

SPECIAL STOCKHOLDERS' MEETING.

Executive Office,
Western Union Telegraph Co.,
145 Broadway, New York, March 9th, 1872.

Notice is hereby given, that in accordance with Article I of the By-Laws of the Western Union Telegraph Company, and on the request in writing of a majority of its Directors, a Special Meeting of the Stockholders of said Company is hereby called, to be held at the Executive Office of the Company, in the City of New York, on Wednesday, April 3d, 1872, at 1 o'clock P. M., for the purpose of authorizing the issue of Bonds of the Company to an amount not exceeding the sum of Fifteen Hundred Thousand Dollars, secured by mortgage upon the real estate of the Company on the corner of Dey Street and Broadway, in the City of New York, in order to provide funds for the payment of the remaining instalments of the purchase money of said real estate, and for the erection of a suitable building thereon.

The Transfer Books will be closed for this purpose at the close of business on the 23d inst., and will be opened on the morning of April 4th.

Stockholders may vote at said meeting personally or by proxy, and in pursuance of the usual custom a proxy is enclosed herewith. If not able to be present, please sign and return to the Secretary, who will put on and cancel the required revenue stamp.

WILLIAM ORTON, President.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

Executive Office,
Western Union Telegraph Company,
145 Broadway, New York,
March 15, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since March 1, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the Journal *as possible.*

NEW OFFICES.

389 Auxvasse, Mo.
337 Barclay, Ill.
327 Belle Flower, Ill.
423 Brownsville, Mo.
52 Bath, Pa.
327 Clinton, Ill.
122 Casselman, Pa.
327 DeWitt, Ill.
83 Factoryville, N. Y.
389 Fulton, Mo.
308 Gibson, Ill.
25 Greene, R. I.
484 Jewett, Texas. Re-opened.
308 Melvin, Ill.
381 Madison, Ark. Re-opened.
122 Mt. Savage Junc., Md.
67 Newport, Del.
323 Norkeeta, Miss., formerly known as Gainesville Junc., Miss.
330 Rutherford, Tenn.
308 Roberts, Ill.
53 Seaville, N. J. Check Cape May C. H., N. J.
83 Spencer, N. Y.
52 Three Bridges, N. J. Check Flemington, N. J.
83 Van Ettenville, N. Y.
83 West Danby, N. Y.
122 Yoders, Pa.

OFFICES CLOSED.

Allens, Ind.; Beckwith, Ill.; Belle River, Ill.; Columbiana, Ala.; French Village, Ill.; Pioneer, Pa.; Struthers, O., and Williamsport, Ind.

GENERAL INFORMATION.

The following is a revised list of offices on the Marietta and Cincinnati telegraph line, with "Tariff for Other Lines" from Cincinnati, Chillicothe and Marietta, O.

Route of business same as heretofore.

Barlow, O.	85	6	Cincinnati, O.
	70	5	Chillicothe, O.
	45	3	Marietta, O.
Belpre, O.	75	5	Cincinnati, O.
	65	4	Chillicothe, O.
	35	2	Marietta, O.
Big Run, O.	75	5	Cincinnati, O.
	55	4	Chillicothe, O.
	40	3	Marietta, O.
Blanchester, O.	45	3	Cincinnati, O.
	50	3	Chillicothe, O.
	75	5	Marietta, O.
Frankfort, O.	60	4	Cincinnati, O.
	35	2	Chillicothe, O.
	65	4	Marietta, O.
Greenfield, O.	55	4	Cincinnati, O.
	40	3	Chillicothe, O.
	65	4	Marietta, O.
Hamden, O.	70	5	Cincinnati, O.
	40	3	Chillicothe, O.
	55	4	Marietta, O.
Hillsboro, O.	80	6	Cincinnati, O.
	85	6	Chillicothe, O.
	110	8	Marietta, O.
Jackson, O.	70	5	Cincinnati, O.
	45	3	Chillicothe, O.
	60	4	Marietta, O.
Leesburgh, O.	55	4	Cincinnati, O.
	40	3	Chillicothe, O.
	70	5	Marietta, O.
Londonderry, O.	65	4	Cincinnati, O.
	35	2	Chillicothe, O.
	60	4	Marietta, O.
Lynchburg, O.	80	6	Cincinnati, O.
	85	6	Chillicothe, O.
	110	8	Marietta, O.
Mineral City, O.	70	5	Cincinnati, O.
	50	3	Chillicothe, O.
	50	3	Marietta, O.
Martinsville, O.	50	3	Cincinnati, O.
	45	3	Chillicothe, O.
	70	5	Marietta, O.
Madisonville, O.	35	2	Cincinnati, O.
	60	4	Chillicothe, O.
	75	5	Marietta, O.
New England, O.	75	5	Cincinnati, O.
	55	4	Chillicothe, O.
	40	3	Marietta, O.
New Vienna, O.	50	3	Cincinnati, O.
	45	3	Chillicothe, O.
	70	5	Marietta, O.
Petrea, O.	70	5	Cincinnati, O.
	45	3	Chillicothe, O.
	60	4	Marietta, O.
Scott's Landing, O.	75	5	Cincinnati, O.
	60	4	Chillicothe, O.
	30	2	Marietta, O.
Vincents, O.	75	5	Cincinnati, O.
	60	4	Chillicothe, O.
	35	2	Marietta, O.
Zaleski, O.	70	5	Cincinnati, O.
	45	3	Chillicothe, O.
	50	3	Marietta, O.

The P. O. address of Hicks Ferry, Pa., is Bell Bond, Luzerne Co., Pa.; of Oakland, Pa., Mountain Home, Monroe Co., and of Liberty, N. Y., Cohocton, Steuben Co., N. Y.

The name of the office heretofore known as Petersburg, Clarion Co., Pa., has been changed to St. Petersburg, Clarion Co., Pa., and that of Mantua, N. J., has been changed to Wenona, N. J.

Business for Wenona, N. J., should be checked to Woodbury, N. J.

Hereafter business for Camden, S. C., will be sent and checked to Columbia, S. C., instead of Kingsville, S. C., as heretofore.

The office at Tionesta, Pa., will hereafter be checked as an Other Line Office, "tariff for other lines" 25 and 2 from Oil City, Pa., check Oil City.

Business for West Killingly, Conn., should be sent and checked to Danielsonville, Conn.

The square for Osage, Mo., will hereafter be 389 instead of 388.

Tariff for Other Lines from Little Rock to Arkadelphia, Ark., will hereafter be 100 and 7.

Business for Mason City, Iowa, will be checked as on Northwestern lines. See Journal Supplement of February 1, 1872.

OFFICES HAVING "SPECIAL SHEET A,"

will hereafter use "special rate" to New York city in computing tariff to Hunters Point, L. I., also check Mohawk, N. Y., same as "Special rate" to Ilion, N. Y., and Carbondale, Pa., same as Special rate to Scranton, Pa.

CUBA CABLE BUSINESS.

We are notified that the Cables to the Windward Islands are now completed and open for business. Following are rates in gold to all points beyond Havana:

To	*Offices in U. S. East of the Mississippi River, including St. Louis, Mo.* 10 Words.	*Extra Words.*	*Offices in Nova Scotia and New Brunswick.* 10 Words.	*Extra Words.*	*Offices West of Mississippi River, except St. Louis, Mo.* 10 Words.	*Extra Words.*
Santiago de Cuba,	6.25	.53	7.25	.63	9.00	.90
Kingston,	7.50	.66	8.50	.76	10.25	1.03
Porto Rico,	11.25	1.03	12.25	1.13	14.00	1.40
St. Thomas,	11.63	1.07	12.63	1.17	14.38	1.44
St. Kitts,	12.50	1.16	13.50	1.26	15.25	1.53
Antigua,	12.75	1.18	13.75	1.28	15.50	1.55
Guadaloupe,	13.13	1.22	14.13	1.32	15.88	1.59
Dominica,	13.50	1.26	14.50	1.36	16.25	1.63
Martinique,	13.75	1.28	14.75	1.38	16.50	1.65
St. Lucia,	14.00	1.31	15.00	1.41	16.75	1.68
St. Vincent,	14.25	1.33	15.25	1.43	17.00	1.70
Greneda,	14.75	1.38	15.75	1.48	17.50	1.75
Barbadoes,	14.88	1.39	15.88	1.49	17.63	1.77
Trinidad,	15.25	1.43	16.25	1.53	18.00	1.80
Demerara and Berbice,	17.25	1.63	18.25	1.73	20.00	2.00

WILLIAM ORTON, President.

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TELEGRAPHERS' MUTUAL LIFE INSURANCE.

TWO DEATHS.

We are sorry to have to record the death of two members of the Association since our last issue.

The first is that of George Henry Patriquin, one of the staff of the New York, Newfoundland and London Telegraph Co., at Plaister Cove, who died at Tatamagouche on the morning of February 29th. Mr. Patriquin was seized with typhoid in December last, and after a struggle of six weeks, his lungs became so much affected that he sank in rapid consumption. He was twenty-four years old, joined the Western Union Telegraph Co. in the fall of 1867, at Plaister Cove, and has served in that office since the transfer until the illness which terminated in his death. He was a consistent member of the Temperance Association there, and was beloved by all who knew him. Such is the brief record sent us by Mr. Scanlan his chief.

This death calls for

ASSESSMENT NO. 26.

The second death is that of Naylor L. Brown, long an operator in the New Orleans office, who died at Athens, Tenn., at the home of his mother, March 3d, 1872. His mother is represented as in needy circumstances. We have as yet no further particulars.

This death calls for

ASSESSMENT NO. 27.

As the avails of Assessment No. 26 belong to the heirs of Mr. Brown, they will perceive that no settlement can be made until that assessment is collected, the only money on hand being a few advance payments for which credit is duly given.

As the Association enlarges, it will be found a convenience as well as perhaps a necessity to have some one who will act as the agent of a district to whom money can be sent. Perhaps the superintendents, many of whom are members, would be willing to make some arrangement by which this could be easily and unlaboriously done. The remittance of money has been a great bar to membership, and some here resigned because of its uncertainty.

A NEW TREASURER.

As our prospective release from our present duties has made it necessary to resign the Treasurership of the Association, to take effect April 1st, the members are called upon to nominate some one for that office.

At a meeting of the Executive Committee, held March 11th, it was

Resolved, That a general meeting of the Association be called to meet at 145 Broadway, on the 21st instant, at 5:30 P. M., to take action in regard to the resignation of Mr. J. D. Reid as Treasurer, and the election of a successor.

We have performed the duties of Treasurer now for four and a half years, and, although it has brought much labor and absorption of time, yet we have great cause for gratitude that we have had a part in so beneficent a work. The Association has been a blessing to many a family and lighted up many a dark heart. Now we would like to be succeeded by the very best man who can be found, and we merely whisper to our friends that we think they cannot do better than vote for Mr. A. S. Brown, the worthy and trustworthy manager of the operating department in New York. We presume votes will be permitted by mail, and it is very important that a good man be chosen. The Association is enlarging, nearly two hundred having joined since January first, and it will require, of course, much wisdom to properly direct its development.

Of course various questions arise in connection with the Association from time to time which lead to discussion, but none so far to disturb its harmony. For example: A member allows his membership to go by default of payment After a couple of years he is an applicant for membership again. His certificate of health is all right, but, on the books nine assessments have been made since he dropt his membership, and he wants to avoid these by coming in as a new member. This the Executive cannot do. A member can be restored only by paying up all past dues. Such is the present rule. Time may make it necessary to modify it, but at present there is no escaping it, and none can complain of its injustice.

About a year ago, ten young men in a distant State applied for membership. They were accepted. Soon afterwards Assessment No. 21 was declared. The Secretary, under a mistaken idea that these parties were not liable for that assessment, notified them to that effect. No. 21 therefore stands a blank on the Treasurer's books, and the parties claim exemption because of the official notice. Now, in morals, nothing false is binding. It is equally true in common sense. Suppose the Secretary had notified these parties that they were liable for No. 20. Would they have paid it because officially notified? The argument wont bear stating. The executive board cannot waive payment, for they have no right so to do. Nothing can close the blank in the book but payment. The most careful of men will make an error. Every member is liable for every assessment ordered after the date of his certificate.

TELEGRAPHER'S MUTUAL LIFE INSURANCE ASSOCIATION.

Payments received on Assessment No. 25, occasioned by death of Charles A. Kellogg, in Rochester, N. Y., February 3, 1872.

2	4	5	8	13	16	17	19	21	25	26
27	28	29	33	40	41	42	49	52	54	55
58	61	65	67	69	70	74	75	77	78	82
86	89	90	91	93	95	97	98	100	104	106
108	111	114	120	121	127	129	131	134	136	138
139	141	142	143	144	145	146	148	150	154	156
158	160	162	164	166	172	176	178	179	181	182
185	186	187	189	190	191	192	193	197	198	200
201	202	209	210	213	215	217	218	220	225	228
231	232	233	235	237	238	239	240	242	243	244
245	246	247	248	251	254	255	257	258	267	269
271	273	274	275	277	278	279	280	281	282	283
285	288	289	294	297	301	303	312	323	327	328
330	342	344	346	347	349	350	352	354	357	359
360	361	362	364	366	367	372	376	378	379	382
383	385	388	389	392	393	394	398	402	405	406
413	414	416	417	418	425	426	428	429	430	433
434	435	437	438	440	441	445	451	453	455	457
466	467	468	469	470	471	474	475	476	477	478
481	482	483	484	485	490	494	495	496	497	499
500	503	504	505	506	507	508	509	510	511	512
514	515	520	524	527	528	532	533	536	542	548
549	554	555	556	557	561	562	564	566	573	574
576	577	579	583	584	587	588	592	594	597	603
604	608	616	617	618	622	627	628	629	630	632
648	649	655	656	659	660	662	663	664	665	667
669	670	672	678	679	680	684	685	690	692	694
695	697	698	700	701	702	703	704	705	708	711
712	714	715	717	721	723	724	725	726	728	729
730	731	732	733	734	735	737	738	740	743	744
750	751	756	758	762	763	764	766	769	772	773
774	775	776	777	778	780	781	782	783	785	786
790	791	795	797	798	799	802	803	804	808	812
813	817	823	825	830	831	832	836	838	841	842
848	858	868	869	871	873	874	875	876	880	882
886	897	899	904	905	906	907	908	911	912	914
915	916	922	926	927	929	930	931	938	940	941
942	943	944	945	946	949	951	952	954	955	956
957	958	959	960	963	964	966	976	977	978	979
980	991	992	995	996	998	1002	1005	1009	1011	1013
1023	1024	1025	1028	1030	1031	1032	1033	1034	1035	1039
1040	1042	1043	1047	1048	1050	1054	1055	1056	1057	1058
1059	1061	1062	1063	1069	1071	1073	1074	1075	1076	1077
1079	1080	1081	1088	1090	1091	1092	1099	1100	1101	1102
1103	1104	1111	1125	1126	1132	1134	1135	1136	1137	1139
1141	1142	1143	1144	1145	1146	1147	1148	1149	1151	1153
1155	1156	1157	1158	1159	1160	1161	1162	1164	1165	1166
1167	1168	1169	1170	1173	1174	1180	1181	1182	1183	1185
1186	1190	1191	1192	1193	1195	1196	1198	1200	1201	1202
1204	1205	1208	1210	1213	1214	1215	1216	1217	1218	1221
1222	1223	1225	1228	1229	1232	1333	1234	1235	1237	1238
1239	1240	1241	1244	1245	1246	1248	1250	1252	1253	1254
1256	1257	1258	1259	1260	1262	1263	1264	1265	1266	1267
1268	1269	1270	1273	1274	1275	1276	1277	1278	1279	1282
1283	1284	1285	1286	1287	1288	1289	1290	1292	1294	1295
1299	1300	1301	1302	1304	1305	1308	1323	1325	1326	1327
1328	1329	1333	1334	1335	1336	1337	1338	1339	1340	1341
1343	1344	1345	1346	1348	1349	1350	1351	1353	1354	1355
1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366
1368	1369	1370	1371	1373	1374	1376	1378	1379	1380	1381
1405										

ASSESSMENT NO. 26.

Occasioned by the death of George Henry Patriquin, at Tatamagouche, C. B., February 29, 1872. Assessments received to March 12.

2	27	29	53	64	95	117	140	153	171	177
188	208	211	246	254	271	287	301	302	316	319
323	332	340	341	353	371	372	378	379	380	381
411	412	463	464	475	490	509	547	552	560	570
576	600	615	622	623	626	639	655	710	716	809
812	856	870	874	910	915	917	939	943	1001	1006
1014	1016	1019	1026	1043	1046	1058	1066	1092	1154	1155
1156	1157	1158	1159	1160	1161	1162	1165	1177	1178	1185
1199	1220	1222	1245	1247	1251	1255	1296	1323	1374	1400

ASSESSMENT NO. 27.

Occasioned by the death of Taylor A. Brown, Athens, Tenn., March 12, 1872. Assessments received to March 12, 1872.

2	53	64	117	140	153	171	177	188	208	254
301	302	316	371	378	411	412	464	490	509	552
560	564	615	623	626	710	716	874	910	915	917
943	1026	1092	1154	1165	1220	1222	1245	1255	1296	1323

HUMBOLDT, TENN., Feb. 26, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR: The announcement of your intended withdrawal from the editorial charge of the JOURNAL, which you have conducted so ably, reminds me of a neglected duty, that of remitting you the inclosed P. O. order for subscription past due. All who are identified with the telegraph, many of whom have not had the pleasure of a personal acquaintance, have learned through the JOURNAL to honor and love you, and your leaving our ranks will be universally regretted.

Trusting that you will survive many happy, prosperous years, I bid you good-bye.

Yours truly, E. HOWARD.

EXETER, N. H., Feb'y 23, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR: I wish to add my voice in "furthering" the suggestion of D. N. T. in last JOURNAL. Would be willing to pay two dollars per year for a revised and corrected quarterly tariff work. The amount of uncertainty it would save would be worth twice the sum.

Respectfully, X.

BORN.

WHEELER.—At Collinsville, Conn., March 12th, to Perlie A. Wheeler, Operator, a nine-pound son.

MILER.—At Williamsburgh, N. Y., February 11th, to Thos. M. Miler, a son.

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THE LOVERS.

IN DIFFERENT MOODS AND TENSES.

Sally Salter, she was a young teacher who taught,
And her friend, Charley Church, was a preacher who praught;
Although his enemies called him a screecher who scraught.

His heart, when he saw her, kept sinking, and sunk,
And his eye, meeting hers, kept winking, and wunk;
While she, in her turn, fell to thinking, and thunk.

He hastened to woo her, and sweetly he wooed,
For his love grew until a mountain it grewed;
And what he was longing to do then he doed.

In secret he wanted to speak, and he spoke,
To seek with his lips what his heart long had soke;
So he managed to let the truth leak, and it loke.

He asked her to ride to the church, and they rode;
They so sweetly did glide, that the both said they glode,
And they came to the place to be tied, and were tode.

Then homeward, he said, let us drive, and they drove,
And as soon as they wished to arrive, they arrove;
For whatever he couldn't contrive she controve.

The kiss he was dying to steal, then he stole;
At the feet where he wanted to kneel there he knole,
And he said, "I feel better than ever I fole."

So they to each other kept clinging, and clung
While Time his swift current was winging and wung;
And this was the thing he was bringing, and brung.

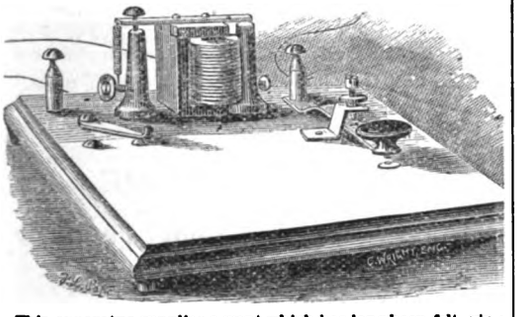
The man Sally wanted to catch, and had caught—
That she wanted from others to snatch, and had snaught—
Was the one that she now liked to scratch, and she scraught.

And Charley's warm love began freezing, and froze,
While he took to teazing, and cruelly tose
The girl he had wished to be squeezing and squoze.

"Wretch!" he cried, when she threatened to leave him and left,
"How could you deceive me as you have deceft?"
And she answered; "I promised to cleave, and I've cleft"

THE NONPAREIL TELEGRAPH APPARATUS.

(Patent applied for.)



This apparatus supplies a want which has long been felt, viz.: that of a SIMPLE and CHEAP

MORSE TELEGRAPHIC INSTRUMENT,

with all the necessary Batteries and other appurtenances in a CONVENIENT and COMPACT form.

By means of a switch, which is now placed on each instrument, they can be worked as desired, either as the open or the ordinary continuous, or closed circuits.

It is intended especially for the use of

STUDENTS, AMATEURS, AND OPERATORS,

but will be found to be equally well adapted for use on

PRIVATE TELEGRAPH LINES,

or Short Lines of any description, which are not over three or four miles in length.

A NEW FORM OF BATTERY

is employed, which is compact, efficient, and economical, and especially adapted to the purpose for which it was designed. Each instrument will be accompanied by a

BATTERY, CHEMICALS, INSULATED WIRE

for connections, together with an

ILLUSTRATED BOOK OF INSTRUCTIONS,

which in itself forms a complete elementary treatise upon the ART OF TELEGRAPHY.

PRICES:

Single Instrument, complete, with Batteries, etc.....$8 00
Two Instruments, " " " " 15 00

Sent by Express on receipt of price.

Remittances may be made by Post Office Order, Registered Letter, or Draft payable to our order. Persons ordering Instruments will please write plainly, giving Post Office, County, and State, with instructions for shipment. Address,

F. L. POPE & CO.,
P. O. Box 6010. 80 Broadway, (Room 51,) New York.

THE NONPAREIL TELEGRAPH APPARATUS may be procured through the leading dealers in Telegraph Supplies throughout the country.

☞ SEND FOR A CIRCULAR. ☜

16,000 MILES

OF

"JOHNSON'S" WIRE

USED BY THE

TELEGRAPHS OF THE UNITED STATES

DURING THE YEAR 1871.

This is sufficient refutation of all the intimations thrown out by the Manufacturers and Importers of other Wires, reflecting upon the acknowledged superiority of the Wire manufactured by

Messrs. RICHARD JOHNSON & NEPHEW,

MANCHESTER, ENGLAND.

Their Works are the Largest in the World.

The great advantage which they possess over other manufacturers is their patent process of drawing Wire in great lengths (averaging 1,200 feet).

All Telegraphers know that, in nine cases out of ten, breaks in Wire occur at joints, hence the less joints the fewer breaks.

Messrs. RICHARD JOHNSON & NEPHEW furnish three-fourths of all the Telegraph Wire used by the

ENGLISH GOVERNMENT.

This Wire is necessarily subject to the tests, etc., imposed by the English Post-office Department.

A large stock always on hand and for sale at the lowest market prices—both free and in bond.

TELEGRAPH LINES

OF ANY LENGTH FULLY EQUIPPED WITH

Wire,
Insulators,
Batteries,
Instruments, &c.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET,
NEW YORK.

Sole Agents for "Johnson's" Wire.
" " " American Compound Wire.
" " Cauvet's Patent Screw Insulator.
" " Sam'l C. Bishop's Insulated Wires and Cables.
" " " Brooks' Patent Paraffin Insulators.

Manufacturers of every description of

TELEGRAPH APPARATUS.

CALLAUD BATTERY,

KEPT ON HAND,

AND

Orders filled by

H. R. DAVID,

17 Platt Street, New York,

W. MITCHELL McALLISTER,

728 Chestnut Street, Philadelphia,

AND BY

GRAY & BARTON,

Agents for the United States,

479 State St., Chicago, Ill.

AMERICAN FIRE ALARM

AND

POLICE TELEGRAPH.

GAMEWELL & CO., PROPRIETORS,

NO. 104 CENTRE STREET, NEW YORK.

J. W. STOVER,
General Agent and Superintendent.

L. B. FIRMAN, Chicago, Ill.,
General Agent for the West and North West.

J. R. DOWELL, Richmond, Va.,
Special Agent for Virginia and North Carolina.

J. A. BRENNER, Augusta, Ga.,
Special Agent for Georgia and South Carolina.

L. M. MONROE, New Canaan, Conn.,
Special Agent for New England.

This system of Fire Alarm and Police Telegraph, with a Central office, or upon the

AUTOMATIC PLAN,

is now in operation in the following cities, to which reference is made for evidence of its great SUPERIORITY, VALUE and UNIFORM reliability:

Albany, .N Y.,	New Orleans, La.,
Alleghany, Pa.,	New Haven, Conn.,
Boston, Mass.,	Newark, N. J.,
Buffalo, N. Y.,	Omaha, Neb.,
Baltimore, Md.,	Philadelphia, Pa.,
Chicago, Ill.,	Pittsburg, Pa.,
Cincinnati, Ohio,	Portland, Me.,
Columbus, Ohio,	Peoria, Ill.,
Cambridge, Mass.,	Providence, R. I.,
Charlestown, Mass.,	Quebec, L. C.,
Covington, Ky.,	Rochester, N. Y.,
Detroit, Mich.,	Richmond, Va.,
Dayton, Ohio,	Indianapolis, Ind.,
Elizabeth, N. J.,	St. Louis, Mo.,
Fall River, Mass.,	St. John, N. B.,
Fitchburg, Mass.,	Springfield, Mass.,
Hartford, Conn.,	San Francisco, Cal.,
Jersey City, N. J.,	Savannah, Ga.,
Louisville, Ky.,	Syracuse, N. Y.,
Lawrence, Mass.,	Troy, N. Y.,
Mobile, Ala.,	Toledo, Ohio,
Montreal, Canada,	Toronto, Canada,
Milwaukee, Wis.,	Washington, D. C.,
New York City,	Worcester, Mass.,
Lynn, Mass.,	New Bedford, Mass.,
Lowell, Mass.,	Bridgeport, Conn.

The distinctive features of these systems of

FIRE ALARM AND POLICE TELEGRAPHS,

ARE,

First—The AUTOMATIC SIGNAL BOXES, the simple electro-mechanism of which enables any one—even a child—to give an *instantaneous, general,* and *definite* alarm of fire.

Second—The AUTOMATIC REPEATER, through which the apparatus may be distributed in a combination of circuits, and the entire system successfully worked without the constant personal attention of either operators or watchmen.

Third—The ELECTRO-MECHANICAL BELL STRIKERS, adapted to produce the full tone of the largest church or tower bells.

Fourth—The ELECTRO-MECHANICAL GONG STRIKER, for hose and engine houses, by means of which the location of the fire is instantaneously communicated to the members of each fire company.

These features combined form the

ONLY PERFECT, COMPLETE, AND RELIABLE SYSTEM

OF

FIRE ALARM TELEGRAPH IN THE WORLD.

Messrs. GAMEWELL & CO. are the owners of the original *FARMER AND CHANNING PATENTS*, one of the most important of which has just been extended for seven years. During the past seventeen years they have spared no expense or effort to secure improvements, and the systems are now covered by

MORE THAN TWENTY PATENTS.

The introduction and operation of the

AUTOMATIC SYSTEM

involves so little expense, compared to the benefit which it confers, that even small communities can profitably adopt and maintain it.

The co-operation of TELEGRAPHERS in securing its introduction into their localities is cordially invited, and their efforts will be duly appreciated and compensated.

Any information desired in regard to the above system will be cheerfully and promptly furnished upon application at the office.

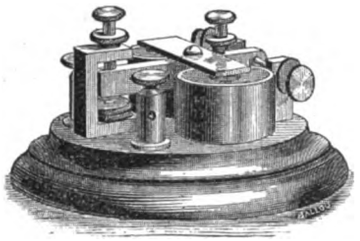
A pamphlet setting forth more fully its advantages and superiority, has been printed, and will be supplied to Municipal Authorities and others interested in Fire Alarm and Police Telegraphy upon application as above.

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M. A. BUELL,

Manufacturer and Dealer in all kinds of

Telegraph Supplies.



A VERY FINE NEW STYLE

SMALL SOUNDERS,

Polished Rubber Covered Magnets, $6.00.

The same, on Mahogany Base and Silver Plated, . . . $9.00

Agent for

Pope's Nonpareil Apparatus,

AND

PUTT & CO.'S MECHANICAL INSTRUMENTS

FOR LEARNERS.

Above Instruments kept constantly on hand at manufacturers' prices.

Materials for Private Telegraph Lines,

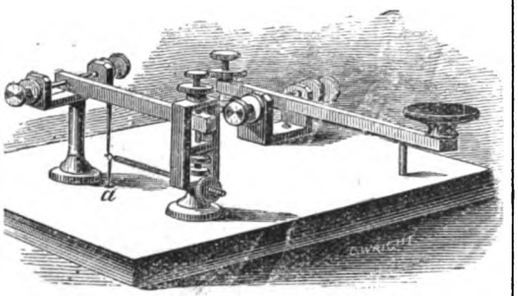
With instructions for putting up and operating.

M. A. BUELL,

26 Waring Block, Cleveland, Ohio.

MECHANICAL TELEGRAPH INSTRUMENT

PATENTED MAY 31st, 1870.



For Students, Colleges, &c. No battery required. An ordinary key and sounder is placed upon a proper base. The sounder is moved by a lever under the base, connected with the key, making a perfect instrument for those wishing to learn the Art of Telegraphy. An expert could not tell, without examining it, that the instrument was not worked by a battery.

It should be introduced into every school and family where there are those who wish to learn the Art.

Hundreds of persons throughout the country desire to become expert Telegraphists, and are constantly seeking permission to practice in the various telegraph offices.

This instrument is an outgrowth of this pressing demand. The Inventor is himself a practical operator, now in active service. Operators and others wishing to teach or learn the Art, will be delighted with this instrument.

It can be placed anywhere, as it does not occupy a space more than six inches square.

Its cost is but $7, and there is no expense whatever to keep it constantly in working order.

We will send a copy of SMITH'S MANUAL, free of charge, with each instrument, to individuals or clubs. The instructions in this Manual are particularly adapted to those who wish to learn by sound.

Special and liberal terms to manufacturers.

Remittances can be made by certified draft on New York, Cleveland, or Pittsburgh, money by express, charges paid, post office order, or registered letter at our risk.

Parties ordering instruments, from points except well-known cities, will please give the name of county and State.

Price, $7. Silver Plated, Extra Finish, $10.

Address, D. W. PUTT & CO., Wellsville, O.

D. W. PUTT,
P. BRUNER,
W. G. BROWNSON.

These instruments can also be procured at the same price from L. G. Tillotson & Co., New York; Bliss, Tillotson & Co., Chicago, Ill.; Chas. Williams, Jr., Boston, Mass.; M. A. Buell, Cleveland, O.

WIRE IN BOND.

For the accommodation of the

SOUTH AMERICAN, CUBAN and MEXICAN TRADE,

we shall hereafter keep a stock of the Celebrated

"JOHNSON" WIRE,

both plain and Galvanized, in Bond, ready for shipment from New York.

PRICES AS FOLLOWS:

No. 9, Plain Annealed	4½ cts. Gold.
No. 9, Galvanized	5¼ "
No. 8, Plain Annealed	4¾ "
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This Brand of Wire is the best in the world, and has been adopted exclusively by the Western Union and many other Telegraph Companies.

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NEW YORK, March 15, 1871.

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FRANK L. POPE,
Associate Editor of the "Telegrapher."

NEW YORK, April 21, 1871.

I fully accord in the above opinion of the Self-Supplying Pen-Holder, having tested it for some time.

SAMUEL F. B. MORSE.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 9. NEW YORK, APRIL 1, 1872. WHOLE NO. 106.

PRIMEVAL PRESENTIMENTS OF THE ELECTRIC TELEGRAPH.

One of the most extraordinary facts in the whole history of the Sciences and Arts, is the strong presentiment which existed for a century or more at the revival of learning that magnetism would be used to convey intelligence without regard to time or space. Just as there is now a kind of presentiment that electricity will supersede steam, or just as it was long thought a philosopher's stone would one day be discovered to turn all things to gold, or an elixir of life to banish old age, so the magic girdle which connects land and land beneath the waves of the ocean was not unknown to the scientific dreamers of the Baconian age.

Fifty wild things, indeed, are anticipated for the one thing which turns out true. The squaring of the circle, the *perpetuum mobile*, sympathetic cures and the whole budget of paradoxes have agitated the brains and excited the hopes of unfortunate genius for centuries back, but now these things are acknowledged to be illusory and impossible. And yet that which might have seemed most illusory and impossible is an accomplished fact.

In his very interesting account of the gradual triumph of the electric telegraph, Mr. Dodd has referred to this strange presentiment, and has given a quotation of the passage in the Prolusiones, of Strada, published in 1617, which describes in the most exact manner the working of the telegraph in 1867. Let a person who has used the latest form of Mr. Wheatstone's household letter telegraph try to describe the procedure, and we think he could not describe it better than in the following words:

"If you wish your distant friend, to whom no letter can come, to learn something, take a disk, or dial, and write round the edge of it the letters of the alphabet, in the order in which children learn them, and in the centre place horizontally a rod, which has touched a magnet, so that it may move and indicate whatever letter you wish."

A similar dial being in the posession of your friend.

"If you desire privately to speak to the friend whom some share of the earth holds far from you, lay your hand on the globe, and turn the moveable iron as you see disposed along the margin of all the letters which are required for the words. Hither and thither turn the style and touch the letters, now this one, and now that. * * * Wonderful to relate, the far distant friend sees the voluble iron tremble without the touch of any person, and run now hither, now thither; conscious, he bends over it, and marks the teaching of the rod. When he sees the rod stand still, he, in his turn, if he thinks there is anything to be answered, in like manner, by touching the various letters, writes it back to his friend."

No wonder that Strada, as he finishes this description, should break forth into prayer:

> "O utinam hæc ratio scribendi prodeat usu!
> Cautior et citior properaret epistola, nullas
> Latronum verita insidias, fluviosque morantes."

"O would that this method of writing might be brought into use! More safely and swiftly would the letter be speeded, fearing neither the snares of robbers, nor the delaying rivers."

Mr. Dodd suggests that in this wonderful description Strada was merely giving play to his imagination. In the midst of Strada's classical trifles, it was doubtless a mere play of the imagination. When Addison, in the *Spectator* (No. 241), alludes to Strada's description, he speaks of it as "an account of a chimerical correspondence between two friends by the help of a certain loadstone:"

"If Monsieur Scudery," he continues, "or any other writer of romance, had introduced a necromancer, who is generally in the train of a knighterrant, make a present to two lovers of a couple of these above-mentioned needles, the reader would not have been a little pleased to have seen them corresponding with one another when they were guarded by spies and watches, or separated by castles and adventures. In the meanwhile, if ever this invention should be revived or put in practice, I would propose that upon the lovers' dial plate there should be written not only the four-and-twenty letters, but several entire words, which have always a place in passionate epistles."

But though in the hands of poets and literary men this notion of a space-destroying telegraph was a fanciful chimera, among the scientific men of the day it was gravely discussed or mysteriously hinted at. From about the middle of the sixteenth to the end of the seventeenth century it is alluded to in most works on magnetism, and many other books of science. The Marquis of Worcester was a diligent collector of all the ingenious notions of his age, and he probably alludes to magnetism when he speaks of "intelligence at a distance communicative, and not limited to distance, nor by it the time prolonged" (Drich's "Life of Worcester," p. 357).

Sir Thomas Browne, in his "Pseudodoxia Epidemica," says of a supposed magnetic telegraph that "the conceit is excellent, and if the effect would follow, somewhat divine." He speaks of it as a conceit "whispered through the world with some attention, credulous and vulgar auditors readily believing it, and more judicious and distinctive heads not altogether rejecting it." But it would appear that, like a true-fellow-countryman of Bacon, old Sir Thomas submitted the thing to the test of experiment, and though the needles were at the distance of but half a span, when one was moved "the other would stand like Hercules's pillars." He also raises several objections to this supposed telegraph, such as that the needles would move contrary ways, and the difference of longitude would prevent two persons from watching their telegraph needles exactly at the same moment.

Joseph Glanvill, in his "Scepsis Scientifica" (1665). devotes a chapter to considering three instances of reputed impossibilities. One of these is the magnetic telegraph, which he describes as composed of sympathetic needles and an abecedarian circle. He mentions and controverts the objections of Sir Thomas Browne, suggesting that "there are some hints in natural operations that give us probability that it is feasible." And it is with a strange feeling of wonder that we find a writer two hundred years ago concluding in these words: "Though this pretty contrivance possibly may not yet answer the expectation of inquisitive experiment, yet it is no despicable item, that by some other such way of magnetic efficiency, it may hereafter with success be attempted, when magical history shall be enlarged by riper inspections; and 'tis not unlikely but that present discoveries might be improved to the performance." The predictions of men are not often so cautiously stated or so completely fulfilled, that we can afford to overlook a sentence such as the above.

Gilbert, the cotemporary of Bacon, and the founder of the science of magnetism, does not allude to this imaginary telegraph, so far as we can find, or if he does, he dismisses it, among other fancies, as unworthy of his great treatise, "De Magnette." Much about the same time (1629) Nicholas Cabeus, the Jesuite of Farrara, wrote his "Philosophica Magnetica." "It is a fable," he says, "that two men can converse with each other between the most remote and separate places, by the aid of two revolving needles," and he considers that those ought to be severely castigated who, with such portentious fables, deter men from the study of true causes. Such an effect, he says, cannot be produced by magnets, and he proves the fancy to be an error, "lest any one should be deluded by a vain hope." Vague and erroneous though the notions of a telegraph then were, they were truer then the refutation of Cabeus, grounded on the false principle that "every physical agent determines for itself a certain sphere of activity, beyond which it cannot have any influence."

But the interesting question remains, to whom is due the first suggestion that intelligence may be conveyed by magnetism or electricity? Strada attributed it to the celebrated Cardinal Bembo, the Secretary of Leo X. But Bembo, who died in 1547, was a historian and literary characrer, and would hardly be likely to form so new a conception, of a purely scientific kind.

The earliest work in which we have been able to trace the discription of the supposed telegraph is the celebrated "Natural Magic," of the Neapolitan Paptista Porta, published in the year 1589. This work is a collection of all that was most wonderful in the sciences, then aroused from a long sleep in Italy. His seventh book is on the "Wonders of the Magnet." In the preface he enumerates these wonders, such as the mariner's compass, the perpetual motion and the sympathetic needles. "I do not fear," he says, "that with a long absent friend, even though he be confined by prison walls, we can communicate what we wish by means of two compass needles circumscribed by the alphabet." A few lines before, we find him mentioning, with great respect, Marco Polo, the source of some of his information. But in het eighteenth chapter of the same book we get more, probably, to the origin of the notions in question. The fact that if a magnet be placed beneath a table, it will affect a magnetic needle above the table, in spite of the intervening matter, is mentioned by

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Porta with much wonder. This is the experiment which seems to have suggested the power of two magnetic needles to act upon each other at a distance, even though prison walls intervened. And strange to say, this experiment may be traced back to the great St. Augustine. "Novit hoc experimentum Divus Augustinus," says Porta, and an exact description will accordingly be found in Augustine's treatise "De Civitate Dei," a work believed to have been begun A. D. 413.

It is the fashion in these days to fall into raptures of wonder and exultation over the magnetic telegraph, but it is not we who have first wondered. Pliny counted the loadstone as the most wonderful thing in nature. "*Quid enim mirabilius?*" he asks. "Iron is the strongest thing in nature, and yet before the magnet it becomes docile," he reflects, "*cedit et patitur mores.*" All ages, then, have shared in the intelligent wonder excited by the powers of magnetism. It is only the riper inspections of this age that have carried out to the letter the anticipations of former ages. The telegraph of the present time tends to assume exclusively the form most nearly analagous to the conceptions of Porta. The earliest attempts at electric telegraph, as Mr. Dodd well relates, were made with frictional electricity, which is not applicable to the purpose. Then galvanism was studied, and the conducting powers of metalic wires became understood. Now, the most improved telegraphs consist essentially of a magnet moved in front of one end of a wire, and a magnetic needle which is thereby made to move in front of the other end of the wire. And though a wire is quite indispensable to conduct magnetic influence in one direction, it is a fact that the return current passes back without a wire, through land and sea, stayed neither by wall or mountain, as Porta imagined to himself.

The time is rapidly approaching when Ariel's girdle will be completed, and signals be transmitted round the world in a moment. It is idle, perhaps, to suggest that Shakespeare may have had some thought of magnetic communication when he conceived that fantastical idea. Certain it is, however, that the conceit of a space-destroying telegraph was "whispered through the world with some attention" in his age, and we have thought this to be a fact worthy of being a little better known.—*London Spectator.*

CONTENTS OF DISPATCHES—GIVING TESTIMONY.

Giving testimony in court as to the contents of dispatches has always been a delicate matter, and one respecting which too much care cannot be taken. An operator can never know the full scope of the meaning of a message. It was never designed he should know. The telegraph company, president, operator, messenger, and all, are so much machinery put in motion to do a certain thing, in which they have only the duty of the engine on a steamboat, or the locomotive on a train, or the engineers of either. No officer of a telegraph company has a right to refuse a properly-written dispatch, when the tariff is offered for sending it, and when sent, he has no right to show it to any one, to speak of it to any one, or in any way make use of it, except to preserve it safe from every eye, and to resist any change in its possession. So far, an operator's duty is presumed to be generally understood, although it will do no harm to reiterate the nature of that duty, as we now do. There are some operators so garrulous, so full of the importance of an acquired secret, that they seem incapable of retaining it, and by all the well-known useless cautions of secret-tellers, let it out to favorite ears, as strictly confidential, and soon make it as common as the town clock or an alarm of fire. To such it will be no harm to say what we have said as to the absolute inviolability of dispatches. On this head, the Legislature has made a most emphatic movement, and an operator, or any one else, divulging or obtaining improperly the contents of a dispatch is made liable to a fine of $500 to $1,000.

The object of this article is to relate the case of an examination in the Superior Court, New York city.

The Telegraph Company was subpœned to produce a dispatch written some five years before, and its agent accordingly presented himself, was sworn, and requested, after some preliminary questioning, to read the message.

Witness refused.

Counsel then asked witness to give him the dispatch to read.

Witness refused.

No appeal meanwhile had been made to the judge, to whom, however, after refusal to deliver to the counsel, witness was willing to give the dispatch on his demanding it, stating that the judge's authority was the only one he could recognize. On appeal by both the counsel in the case, the Judge remarked as follows:

"This case is new, and I am not aware of any decision having been made under such circumstances. I am compelled, however, to hold a telegraph dispatch as inviolable, unless its contents become essentially necessary to the ends of public justice. The telegraph company cannot divulge, except on compulsion, any message in its possession without crime. It occupies a most sacred position as the depositary of innumerable secrets, which it can no more divulge than a man can be compelled to divulge his most confidential family affairs, or than a priest can be required to divulge the secrets of his communicants. I therefore approve of the refusal to read or allow to be read the dispatch which witness appears to have in his possession, unless it finally appears that justice is in danger without it. I shall, however, direct the clerk to take a copy of this dispatch, to be held by him as the property of the court only, and subject alone to its call and inspection, and to none other without its authority."

The dispatch was thereupon copied, the original handed to witness, and he was released.

OCEAN TELEGRAPHY.

[From the London Standard.]

The following letter is being circulated among the shareholders of the Anglo-American and French cable companies:—

GENTLEMEN—I submit, on behalf of myself and some of the largest shareholders in both companies, the accompanying scheme for complete amalgamation (the result of many months' careful consideration), and I recommend it to your earnest and immediate attention, on the following grounds:—1. Complete unity of interest and action in all matters. 2. Large saving in working expenses. 3. Considerable profit on the lease of the Newfoundland lines at seven per cent. in lieu of the present arrangement. It has been ascertained that the Newfoundland Company will accept these terms. 4. Greatly increased confidence of investors from having four cables in one interest. 5. The certainty of uninterrupted communication—a matter equally important to the shareholders and the public. 6. The application of our reserve fund to the redemption of our seven per cent. debentures, instead of lending money on other securities, and the giving us all the benefit of a fourth cable at once in anticipation of future reserve. 7. The exclusion of new competitive schemes. 8. The gradual reduction of rates for messages, which our increased carrying power would enable us to concede to the public. Thus in every way the proposed amalgamation is of the greatest advantage to us as shareholders, as well as to the public; and, on the other hand, in no conceivable way can it be of any disadvantage. I enclose a form of assent to the proposed scheme, and shall feel obliged by your forwarding it to me, filled up, without delay. It is not a form of proxy, and does not prevent you from giving your assent to any modified scheme. It merely asserts the general principle that we ought to obtain all the benefits to be derived from amalgamation. I am, sir, yours, obediently.

January 11. WILLIAM FORD,

ATLANTIC CABLES COMPANY (LIMITED).

Capital, £5,550,000, consisting of £2,775,000 seven per cent. preferred stock, and £2,775,000 deferred stock. Debenture capital, £1,000,000, with power to increase on additional cables being laid. The Anglo-American shareholders to receive for each £100 of Anglo-American stock £100 seven per cent. preferred and £100 deferred stock. The French cable shareholders to receive £100 of preferred and £100 deferred stock for every five shares in their company. The Newfoundland company to be leased at seven per cent. guaranteed dividend. A fourth cable to be laid to Halifax or such suitable point as may be agreed upon at a cost of £1,000,000. This amount is to be raised in seven per cent. debenture stock, redeemable at £110 by an accumulative sinking fund of three per cent. The results to the shareholders are estimated thus:—The traffic has now fairly reached £2,000 per day, and certainly will not be less than this in 1872, probably much more. This gives a gross traffic of per annum, £730,000. The working expenses of the three companies will not exceed and may be reduced below £100,000, leaving net £630,000. The rental of the Newfoundland lines, £56,000—£574,000. The debentures and redemption for the fourth cable will not come in until 1873; but assuming this as a charge in 1872, £100,000; surplus for dividends, £474,000. Seven per cent. preferred dividend, £194,000, leaving for the deferred stock, £280,000—£474,000, or fully twenty per cent. dividend. It is proposed that the fourth cable shall be connected directly with Liverpool, Manchester, and the manufacturing districts, so as to remove an existing grievance.

MESSRS. HURD & HOUGHTON, of New York, representing the Riverside Press, Cambridge, have in press a reprint of all the cases relating to the liability of Telegraph Companies, chronologically arranged from the English, Irish, and American Reports, with notes and references.

COVERING WIRE WITH RUBBER, ETC.

A foreign exchange describes as follows: a new invention for covering wire with India-rubber, and similar substances, and for making tubing of the same:—"The machine, more particularly designed for covering telegraph wire with insulating material, comprises a cylinder for holding the India-rubber or other gummy substance, and in this cylinder a screw of the same or nearly the same diameter extends through one end, and is supported in bearings and rotated by gearing applied outside the cylinder. At one end of the cylinder is placed the die through which the substance or compound is forced, to form the covering or tube, and through which the wire and the substance pass together. The die is arranged at a right angle to the axis of the cylinder, so that the wire passes transversely across the end of the screw, or at a right angle to its axis. In a line with the die and inserted through the opposite side of the extension piece, is a tubular guide, through which the wire to be covered is admitted and passed to the die. At the rear end of the machine is placed a thrust-pin to receive and sustain the end of the screw against the back pressure. The thrust-pin is formed with a screw-thread, and is thereby adjustable in a socket fixed on the machine."

PHOSPHORESCENCE PRODUCED BY FRICTIONAL ELECTRICITY—M. Alvergniat states that if a little bromide or chlorid of silicium is introduced into a glass tube, and the tube is then exhausted and sealed, friction with a piece of silk, or even with the fingers, produces a beautiful phosphorescence, which is rose colored if the chloride is contained in the tube, and a yellowish green with the bromide. The induction spark produces no light within these tubes unless the vacuum is very perfect, but in that case the phosphorescence disappears.

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RAILROAD TRAIN ORDERS.

AURORA STATION, February 23, 1872.

To the Editor of the Journal of the Telegraph:

SIR: In your issue of February 1st, No. 5, I read with interest three articles in regard to the use and abuse of railroad wires. I am, like T. D., open to conviction. Like him, I can see no safe remedy in Observer's plan; on the contrary, more risk to the railroad company, more danger to human life and to property, where the orders are not repeated. When an order is presented to the conductor and engineer of a train, and their understanding of it repeated back to the dispatcher in charge, and his O.K. received, there is no possibility of any misunderstanding or any mistake, and nothing but the negligent violation of a plain order can in any way cause an accident, excepting, of course, the usual breakage of rails or running gear—things which are unavoidable.

When not repeated back, this security is gone; for, as T. D. says, one operator might give it O.K. and the other one not. I have known instances where two copies of the same order were made by the same operator, and the one given to engineer different from the one given conductor on a repeated order, where the train did not stop and the orders handed to both as they passed, so as to save the conductor a walk over his train to know what his orders were. So, to me there seems more danger where two operators are concerned than where only one is concerned. I may be wrong, and would like to be enlightened if I am. Certainly it would be an advantage to the profession, for better operators would have to be employed and better wages paid. Another Observer says there are cases where one sending would do for both trains. Yes; but for safety have both repeated back. That would save the dispatcher one sending and make it sure, as he could correct any mistake or misunderstanding that might occur in either.

This would remove the responsibility from both the dispatcher and operator. I, for one, want no responsibility of an unrepeated order on my shoulders, and, I think, no other operator does. Possibly Observer does though. Then there is usually more to go in one order than in another; so that there has got to be two sent, or one will contain more than is needed.

For the information of Green Flag, I would say his two orders could be done away with and one made to answer, by having operator copy the order to C. and E. No. 2 at B, which would inform him that No. 2 had right of track over No. 1 to A, upon receipt of which he would put out his green flag, and, upon the arrival of No. 1, show the C. and E. the order, who would then understand that they could proceed no farther until the arrival of No. 2.

Yours, truly, OPERATOR.

THAT'S WHAT'S THE MATTER.

To the Editor of the Journal of the Telegraph:

I have noticed the controversy in the last two or three numbers of the JOURNAL, and have been waiting—very anxiously—to see some one write upon a subject which is of far greater importance than any yet named, viz.: the necessity of operators being secured who are in every way competent. There cannot be too much care or precaution used in the Despatcher's department, in running trains by telegraph. I have had fifteen years' experience in railroading and telegraphing, and this experience tells me that the safest way is the best. My plan would be this:

The Despatcher's first duty should be to secure for his operators men who are *competent*, and who can be depended upon. Men who, when they receive an order, *know* exactly what it requires and what they are to do with it. This can easily be accomplished by paying salaries worthy of such talent. No first-class man is going to serve a corporation that does not compensate his services to their full value. There are plenty of good men who can be found, but they will not work at *starvation* prices. Railroads should think for a moment what they require, and then look at the salaries they pay. After a Despatcher has secured such men his work is easy, and the length of time consumed in giving orders is reduced very materially. In regard to the manner of despatching trains, my view is to first be sure you have the train under your control which *has the right of road*. This can be done by sending the order to the conductor and engineer of said train, giving them a positive order "not to pass a certain point, &c;" or, what would be better where the Despatcher has the right kind of men, giving the order direct to operator, and get his "13," and then order the other train to proceed. This view may look as though it took a great deal of time, but such is not the case. Where the operators are proficient—*as they should be*—two or three minutes is full time to give these orders.

I notice some of your correspondents dictate orders in this wise: "To conductors and engineers Nos. 1 and 2: trains Nos. 1 and 2 will meet at A." He goes on to say, "This would hold No. 1 at 'A' until No. 2 arrived, and give No. 2 the right to run to 'A' regardless of No. 1." I beg leave to differ with him there. No. 1 being the train which has right of road No. 2 has lost her rights and hence *cannot* proceed on this order, and only can run against No. 1 on a *positive* order in so many words giving her the right to run against the train which is on its rights. Where does No. 2 get these rights per his order? Her schedule rules give her a certain number of minutes as her limits, and after she loses this limit, she has no right to proceed against said train until she waits the prescribed limits of the other train, and then, if it has not arrived, she can proceed with caution, flagging all curves and running slowly, until other train is met, which, per its schedule rules, is doing in like manner. This is the way we railroaded before the telegraph was brought into requisition, and what was the telegraph brought into use for, if not to obviate this delay of waiting and trouble of flagging? And how does it give the train the right to run which has no schedule rights to run on, unless it gives a positive order to run? I think there are *many* Despatchers who will bear me out in my view of the case. Another thing Train Despatchers should have the exclusive use of the wire on which they run trains. As there are times when but few orders are necessary, trains being "on time," so there are times when a great many are necessary, and, as in train orders, haste and despatch are required, or else the orders do not assist trains over the road.

I agree with one of your correspondents in regard to the Despatcher knowing the road. He should not only know the road, but he should know where every heavy grade and bad portion is, and the length of every siding, and the capacity of every engine for pulling trains and making time. I would not undertake to "run trains" on any road that I was not acquainted with the above facts, and some others of minor importance. In regard to commercial business being delayed, I think that anyone who will consider all the points will find it the best plan to have a separate wire for this business, especially on a railroad that has a number of trains and does a heavy business. Still, if competent men are employed, there will be found many intervals where commercial business can be got off. Speaking of competent men reminds me of an incident which came under my observation four or five years ago. A road on which I was then employed, at one of its general offices, contracted the habit of "cutting down salaries" at its way stations, and "Jewing" operators, until finally those along its line, at way points, were not even respectable "plugs." The result was that in one week there were *five engines and a number of cars smashed up, two* of the *engines* being on their *first trip* over the road. At the time of the last collision the Superintendent of the road was in my office, and when I told him of it his reply was, "D——n them thirty-five-dollar operators." He thought it, too, for investigation showed that correct orders had been given, and in some of the cases had been neglected as to delivery, and in others had been repeated correctly, and "O K" given, and then operator made *mistake in "copying."* But what more could be expected of men who could not make the alphabet *correctly*. Let roads and corporations pay men who are competent, wages they deserve, and there will be more safety and less grumbling.

Yours, "OLD MAN."

OUR old friend Charles W. Temple, Telegraph Superintendent, Vincennes, Ind., has been promoted to be assistant Superintendent of the Eastern Division of the Ohio and Mississippi R. R. Mr. Albert Hayward succeeds Mr. Temple in the care of the Telegraph, and for which he is fully competent.

TARIFF BOOKS.

INDIANA, February 28, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—I see that some one has brought up the subject in regard to copying tariffs. Now wouldn't it be better to have blank leaves furnished to each office, instead of having new books issued. I don't think it would hurt any of our feelings if it should be done; besides, it would not cost so much as it would to have new books issued every month or two, and would do away with needless blotting and scratching out. Hoping this will have your attention.

I remain, as ever, your friend, J. B.

RUNNING NOTES BY A MANAGER.

While on a recent visit to some friends in Poughkeepsie, up the Hudson, curiosity led me to visit the summer residence of Prof. Morse. It is a little more than two miles out from the town, in a northerly direction, on South avenue. The House, a large gothic wooden frame building, standing away back from the street, some two hundred and fifty or three hundred yards, is hardly to be seen, surrounded as it is with large locust trees. The place is very appropriately called "*Locust Grove.*" A fine view of the surrounding country is to be had from the rear of the house, which overlooks a deep valley and fine scenery.

The hot houses were a treat to go through, with fragrant flowers in full bloom. The place is in charge of Tom Devoy, an excellent gardener, who on several occasions has carried off first prize for the cultivation of grapes. He has been sixteen years with the professor, and during all this time, Tom has never heard a cross word from him. No more faithful or worthy man could be found.

The grounds cover some seventy-five acres, are in excellent order, under good cultivation, with five outhouses, such as ice house, stables, sheds, carriage houses and barn, and all probably worth $90,000.

It is possible Mr. Morse and family may spend this summer at some watering place and not at "Locust Grove."

Mr. Morse's city residence, is No. 5 West 22d street, New York, where he spends the winter. H.

SOCIETY OF TELEGRAPH ENGINEERS.

This young, but welcome and necessary addition to the list of scientific, learned and technical societies, held its opening meeting on Wednesday evening at half-past seven. By favor of the Institute of Civil Engineers, the use of their noble hall was granted for the occasion, and a numerous attendance evidenced the interest taken in this practical inauguration of what will, we doubt not, prove to be a most valuable society. We noticed, some four or five months since, the establishment of the society, and the formation of a council, code of rules, &c. Mr. C. W. Siemens, D.C.L., F.R.S., the president, took the chair on Wednesday, and delivered his inaugural address, which we shall notice at length next week. He adverted to the delay that had taken place in convening the opening meeting, which he explained was in the permanent interests of the society, and further pleaded for an act of indemnity from the general body of the members, in condonation, *ex post facto*, of certain transactions of the council, diverging somewhat from the course prescribed at the outset, especially in relation to the class of foreign members, who are to have all the privileges of affiliation on payment of an annual subscription of £1 sterling. The cordial and unanimous response granted by the assembly, as also in the matter of election of new members by show of hands in lieu of by ballot—somewhat informal—supplied a gratifying endorsement of the action of the representative body. The rules drawn up by the council were accepted as the statutes of the society, twenty-three new members were elected, and the announcement was made of the accession, as foreign members, of all, or nearly all, the delegates at the recent Telegraphic Congress at Rome. The subject of the first paper will be "On Automatic Instrumentation," by Mr. Culley.

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FAMILIAR TELEGRAPH TALKS.

As we have been talking somewhat freely about magnets and their care, let us say something more on the general subject. Magnetism is to form the basis of great developments some day, just as now it is one of the grand powers of the universe. How grand, for example, is the thought that yon quiet sun, ninety-five millions of miles away, holds this great earth within firm hold of its magnetic grasp, and that the quiet moon, 294,000 miles away, ridges up our oceans, and dashes the mighty waters up and down the fretted shores with their everlasting tides!

1. Pieces of iron or steel, which have long remained in a north and south position, become magnets, having acquired the power of attraction and repulsion. As this is so, and as it is also true that a magnetic needle always points north and south, when left free, it shows that the earth's electric currents go east and west, the magnetic needle always taking the direction opposite to the direction of the current. Thus, the magnetic power is in the opposite line of direction to the line of the wire. This has led to the idea, that lines of telegraph running east and west, work better than those running north and south.

2. The turning of a freely poised magnetic needle north and south, is called placing itself in the *magnetic meridian*. This means simply, that it points north and south. The point toward the north is the *North Pole*, so called; the other, pointing south, the *South Pole*. In France, this statement is reversed, the point toward the north being called, and which it really is, the south pole. In magnetic needles, the north pole is usually distinguished by a file cut across near the point. It is the negative pole, and is marked when illustrated, as N; and in electric works, is designated by the sign — in distinction from the south or positive pole +. It is important to remember these signs, as they are frequently employed by electricians.

3. If a magnet be brought near another magnet, and the north pole be presented to the north pole of the other, they will repel each other. The north and south poles attract each other. When soft iron is used, it is attracted equally by either pole, hence the value of always keeping the magnet core as soft as possible; and this is equally true of the armature.

4. What is called the *magnetic field*, is the space in the neighborhood of a magnet, within which it exerts a power on other objects.

5. It is curious, that in magnetism, as in human nature, the poles which attract are much stronger than those which repel, that is to say, when kept in that relation to each other. The magnetic faces tend to strengthen each other, just as friendship intensifies itself in two human hearts. The repellant poles have a different tendency. They say also that the marriages of persons of different natures are the most productive of happiness.

6. Iron receives magnetism quickly, but cannot retain it when soft and pure. This is what makes it so valuable in electro magnets, whose value consists in the ease with which they are magnetized and demagnetized. The latter is the quicker property of the two. Steel is not attracted as forcibly as iron. That is the reason that a hard core is sure to make a weak magnet. Steel, however, holds magnetism more or less permanently, which is a property not wanted in a relay. The strength of a permanent magnet depends on the hardness of the steel and the length of the bar. Iron, when impure or hard, retains what is called by electricians *residual magnetism*. It is well that these terms be made familiar.

7. If a steel bar, unmagnetized, is nicely balanced, and made to point east and west, it will remain level. Magnetize it, and the north end will dip or appear to become heavier. If placed east and west, no such change will appear.

8. The power of a magnet is at its maximum very near the ends or poles. There is no power at the middle. If a magnet is broken in two, each part becomes a complete magnet.

9. It is a curious thing that, in making what is called a *compound* magnet, *i. e.* a horse shoe permanent magnet, composed of several plates laid side by side, if one of the plates be weaker than its neighbor, it will not be strengthened by its strong companion, but weakened, and, indeed, have its character reversed! This puts us in mind of the Scripture saying, that "to him that has much shall be given, but to him that hath not, shall be taken away even that which he hath." So it happens that weak souls go under. A man has to carry himself stiffly these days or his back is broken.

10. The earth is an enormous magnet. It will demagnetize a magnetized bar which has been carelessly laid aside, without regard to its position in relation to the earth. This is the reason for the employment of what is known as a *keeper*, a piece of metal put across the faces of a magnet to preserve its power. These are also called *armatures*. The armatures become magnetized by induction, and, in their turn, induce magnetism in the bars. This mutual induction is more powerful than the inductive influence of the earth.

11. Magnetism acts through all substances not themselves capable of being magnetized. A compass in a brass or wooden box is as easily affected as if it were not so inclosed. In an iron box it would be a question of power, between the iron in the box and the magnet outside.

12. A wire through which a current is flowing possesses, for the time, properties similar in some respects to those of a magnet. It attracts iron filings, attracts or repels the magnet, and even acts upon other wires through which currents are flowing. This peculiar property last named, it will be seen in the first article in the JOURNAL, early gave the idea of telegraphic transmission.

13. Two parallel conducting wires will attract each other if the currents flow in the same direction in both, and repel if they flow in opposite directions. This would seem to point to the advantage of having two wires upon the same arms, worked by separate and opposite polarity, to prevent this natural sympathy of two loving hearts thus "flowing into one," and yet that would be the surest mode of causing the currents to mix.

14. Suppose one's feet to be connected to the copper, and one's head to the zinc pole of a battery, the current would flow upwards through the body. This shows the direction of the currents. If a magnetic needle be then placed before the breast, the north pole will move to the left hand at right angles to the body.

WONDERS OF ELECTRICITY.—The next volume of the richly-bound second series of the Scribners' popular Library of Wonders will be the "Wonders of Electricity," to be ready about the 20th. It is from the French of J. Baile, edited by Pres. John A. Armstrong, of the New York State Normal School, who has made numerous additions of great interest and importance. The book is, like the others of the series, exceedingly entertaining, while it gives full and accurate information as to telegraphing, the electric light, electro-plating, electric motive powers, and other applications of induction machines. Among the most interesting of its pages are those which describe the scenic effects produced by electricity at the Grand Opera, Paris. In the opera of "Moses in Egypt" these were very brilliant and ingenious, the prophet Moses being always surrounded with a radiant light, which seemed to come from his person, though really from an electric lamp at the wings. The difficulties in the practical use of electric engines are clearly explained, and indeed the volume is full of matter of both popular and scientific interest. There are sixty-five illustrations, many of them full-page and very fine.

COUNTING NAMES OF PLACES.

OFFICAL DECISION.

After answering the enquiry of Holley Springs in our last, which we did upon what we regarded as established usage, and also from what we knew of the original design of the rule, which we framed and reported at the convention of 1858, other enquiries came which we deemed it proper to submit to the Company's Electrician, who is charged with the duty of the interpretation of the rules, and from whom we asked an official decision. The following is Mr. Prescott's reply, which shows that we were in error:

ELECTRICIAN'S Office,
Western Union Telegraph Company.
NEW YORK March 21, 1872.

J. D. REID, *Esq.*:

DEAR SIR—In answer to your favor of the 19th, I would say, that I think you misconstrued the rule in your reply to Holley Springs' inquiry, published in the last number of the JOURNAL. According to rule nine, names of places are only to be counted as one word when used to designate places, that is, villages, towns, countries, &c. Of course the words United States, when prefixed to the word attorney, or marshall, are not used to designate a place in the sense of the rule, any more than when prefixed to hotel or Telegraph company, but are simply employed to assist in designating the office held by the persons employed to perform certain functions, and would be counted in the same way as Spuyten Duyvil Station Agent, or Postmaster at Peekskill on the Hudson. The only right the words United States have to be counted as one, is by virtue of their use in designating a place or country. When they are used to signify the nation, that is to say, the people of this country, they must, under the rule be counted as two words, and therefore when used in connection with any officer of the Government as United States Attorney, United States Marshal, or President of the United States, they should be counted as two words, because these functionaries are not officers of the country, the land or place known as the United States, but of the people, as for example, Louis Phillippe was never King of France, that is of the country or place, but King of the French, that is to say, of the nation.

Yours respectfully,
GEORGE B. PRESCOTT.

COUNTING DUPLICATE FIGURES.

CHICAGO, March 15th, 1872.

To the Editor of the Journal of the Telegraph:

In JOURNAL, some months prior to our big fire, you answered inquiry "how figures after words" should be counted; our files of JOURNAL OF THE TELEGRAPH previous to October 8 were destroyed by fire. A dispute has arisen here as to how to count: "Buy five hundred and eighty-five (585) shares." Will you please duplicate your answer of some months ago as our authority in the matter. Yours, &c., G. W. FELTON,
Operator.

Answer.—The rule is that, having counted the number of words used in stating a sum, as for example, the sum given in the inquiry of our correspondent, "five hundred and eighty-five," which is composed of five words, the figures used as an additional expression of the same sum shall be counted the same as the sum expressed in words, viz.: five words. The message quoted, therefore, has twelve words, i. e. ten words for the duplicated sum and two for the words "buy" and "shares." It will be seen, therefore, that the fact that the sum in figures requires only three characters to represent it does not decide the charge therefor, but is fixed by the number of words, as in the example given.

The reason for this rule is to discourage the use of figures in the body of messages.

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TELEGRAPH WIRE TARIFF.

Before the Schenck Tariff act telegraph wire paid thirty-five per cent. duty. The firm of Washburn & Moens, in New York, conceived the laudable design of protecting the American telegraph wire-drawer against the pauper wire-drawer of Europe. Mr. Moens came to Washington early in 1870, and although he ostensibly lived at the Arlington, he nevertheless pitched his tent in the lobby of Congress. He besieged Congress much closer than the Prussians did Paris. After he had sat down before the committee rooms from January to June he carried the position, not by storm, but by strategy. It would never have done for him to put in even that outrageous Schenck Tariff bill that a duty of sixty-two and seven-eighths per cent. should be levied on telegraph wire when the duty then existing was only thirty-five per cent. He had, therefore, resource to a pleasing expedient. The duty on iron wire three-sixteenths of an inch in diameter, whether coated with metal or not, was already two cents per pound and fifteen per cent. ad valorem. He inserted in the infamous steel-rail section of the bill the following proviso:

Provided, That round iron in coils three-sixteenths of an inch or less in diameter, whether coated with metal or not so coated, and all description of iron wire and wire of which iron is a component part, not otherwise specially provided for, shall pay the same duty as iron wire, bright, coppered, or tinned.

Now, inasmuch as telegraph wire was never provided for in any tariff, and came in under the head of unprovided-for articles, paying thirty-five per cent., this ingenious clause of Mr. Moens did the business. Telegraph wire, instead of paying thirty-five per cent. duty as before, has now to pay two cents per pound and fifteen per cent. ad valorem, or together about sixty-three per cent. Such is the history of Mr. Moens' siege and victory. It is rather remarkable that soon after the passage of this act the workmen in telegraph wire demanded either an increase of pay or a reduction of the working hours; but they were less fortunate than their famous strategetical chief—they got neither. The only thing they did get was a strike, and to be starved into submission. And thus does a good Congress protect American industry. Equally remarkable and creditable is the fact that the Western Union Telegraph Company has to send to Manchester, in England, for its wire, not because they would not buy American wire, but simply because the protected American industry is unable to supply their full wants. The net result of our thus raising the duty on this indispensable material is that "American industry" thus protected in the person of the laborer does not make a cent by its Protection; and American industry after Protection is unable to supply the American market; and the only party which makes anything is the rich manufacturer like Mr. Moens. It would be hard to find a more typical example of what a swindle a protective tariff is.—*N. Y. World.*

ELECTRICITY *versus* THIEVES.—A novel, and, as it seems to us, very serviceable, door-fastening has been recently contrived in Berlin. It consists of electro-magnetic machinery for bolting the office doors from the manager's or cashier's desk, a knob being fastened to the desk or counter, by pressure on which the electric current is made to push a heavy bolt across the doors. The effect is instantaneous. The short period employed by a thief or forger in gaining the door, in some cases, suffices for his detection, and, in that event, his escape might be effectually cut off. The machinery has been constructed to the order of a large banking firm in Berlin, in whose office it is now in use, though there has been no occasion as yet to test its powers otherwise than experimentally; but, when so tried, it has invariably given entire satisfaction.—*Handicraft.*

FROM ONE OF THE VETERANS.

DENVER, COL., Jan. 17, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR: One of the pleasant reminiscences of my telegraphic life is having been sent by you to take the place of "Uncle" John Horner as Receiver of the New York office in 1850, on account of a reduction in his salary, owing to the office not paying expenses. Experience proves that he did well to "stick." I sometimes think it would be very pleasant and profitable to have an organization of *Telegraphic Pioneers.*

Perhaps I would hardly be admitted, but I think I would come pretty near it. Such an organization might gather and preserve a great many interesting incidents and matters of historical interest—although I presume you could furnish a "History of the Telegraph in the United States" that would embrace almost everything of interest, including personal anecdotes, &c., &c. With best wishes for the new year, and hoping that many more may be added thereunto in your career, I am, very respectfully, Yours, B. F. WOODWARD.

We cannot believe we were ever guilty of trying to supersede our life-long friend and pitcher, and everybody's friend and pitcher, John Horner. We remember that times were very dry and salaries small. Just think of New York not paying expennses! And yet we had a wire direct to Cincinnati which was the wonder of the hour. John Horner! we ask your pardon. It must have been the result of the delicacy of "reducing" so good a man. It seems very ridiculous now. J. D. R.

BATTERIES IN FRUIT JARS.

We have succeeded in making a quite powerful series of half a dozen elements by using old fruit jars holding about a quart. The copper pole was formed, in the first place, of heavy tea-lead, which costs but little and is easily moulded to any form. As the power of the battery depends largely upon the extent of surface exposed by the copper, we folded the lead in ridges, thus obtaining a large extent of surface at the bottom of a comparatively small jar. We did not go to the cost of having zinc poles cast, but simply took a quantity of zinc fragments, coated them well with mercury, and piled them on a slice of wood, cut endwise off a block, and bored full of holes. The wood and its load were suspended by cords which were tied round the mouth of the jar. By using large jars it is possible to construct batteries of any power that may be required in the arts, and in this way odd scraps of amalgamated wire, that would otherwise be wasted, may be readily utilized. We may add that lead, thin sheet-brass, and even common tin-plate, may be employed for the copper pole of Daniell's battery, and will give quite as good results as pure copper—the fact being that in a very few minutes the entire surface of these metals becomes coated with a deposit of pure copper, and acts like copper.—*Handicraft.*

OWING to the scarcity of Operators at Alton, Ills, Mrs. B. of that place, is endeavoring to supply the want by instructing a young colored gentleman, "Kelly" by name, in the mysteries of the art.

HARRISBURG, Texas, March 15, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR: I notice in the columns of your inestimable paper considerable complaint about crowded tariff books. I think there is a remedy for this, and a simple one, and I would like to make a suggestion in that connection. When any part of the book now in use is filled, would it not be a good idea to rule a sheet of writing paper properly, to correspond with and paste between the leaves where required, and thereby provide space for all the new offices that would probably be opened in a year's time? It would certainly be an easy matter and but a few minutes' work; and, if neatly done, would not present such a bad appearance. I have adopted this plan, and find that it works like a charm; and, I believe, if brought into general use, would save much inconvenience to all and unnecessary expense to the company.

Respectfully, C.

RELAY JUSTIFIES HIMSELF.

CHARLOTTE, N. C., February 26, 1872.

To the Editor of the Journal of the Telegraph.

Please inform "One in Search of Right," (JOURNAL, February 15) whether or not Rule No. 20, authorizes or justifies Relay offices in "patching up" messages, by counting legitimate compound words as two words, and making a compound word out of two separate and distinct words, in order to make the number of words in message correspond with check.

Would you not feel a "slight delicacy" in giving "O. K." to a message "done up" in this manner, especially from an office that required you, repeatedly, to call for a correct check? And would it not be better for Relay offices to exercise a *little* of the "stubbornness"—right thinking men would not so term it, but allowances must be made for "old women" and "dyspeptics"—complained of, and insist, mildly, *very mildly* insist, at least, humbly request that originating office give a check in accordance with rules for counting? (If a young and inexperienced operator, to point out to him his error and instruct him), thereby avoiding an argument about the check at every relay, and at destination, or the necessity of transmitting a "Kite-tail" to messages, admitting they are in error, know it, but refuse to correct.

If "One in Search of Right" could distinguish between the desire on the part of an operator to have business pass through his hands "O. K." and "stubbornness," the question he refers to you would not be so "vexed" in his locality.

The over-charge scrap-iron-car-load-message (one word. How many of them could Kitchen send a minute) was delivered—"subject to correction."

Respectfully, TAR, PITCH & ROSIN.

PIOUS RAILROAD RESIGNATION RECOMMENDED.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—The article which appeared in the issue of December 15, has developed such a number of Telegraphic Horace Greeley's who show "what they don't know about despatching," that I am constrained to remark that in my opinion, none of them have offered any system or method that will to any considerable extent, facilitate both commercial and railroad business. The examples of orders presented in their communications, cannot by any means be taken as average ones, as any operator who has had experience on a long line can testify. All those who are aware that, in many instances, a single delayed train will necessitate orders to nearly every other train on a Division, all or any of which are liable to be changed, as occasion or progress of the delayed train may require. And when from unavoidable causes, many trains are delayed, it becomes greatly more complicated, and the necessity of utmost exclusive use of the line becomes proportionately greater. The wants of the many are always paramount to those of the few. The plan I would suggest as best calculated to obviate difficulty, and the general delay of outside business, is for dispatchers to put their orders in as concise and brief language as will assure safety, and for operators in general, to cultivate a philosophic and pious resignation, always keeping an ear on the main chance—to get in

SELF-CLOSER.

Mr. E. A. CALLAHAN, Superintendent Gold and Stock Telegraph Company, has resigned, in order to take a leading position in the introduction of the Reporting Telegraph system in Great Britain. It is stated that there are still 4 000 miles of private telegraphs in Great Britain.

WALCOTT, Iowa, March 15, 1872.

To the Editor of the Journal of the Telegraph:

Permit me to express my hearty commendation of the remarks of "D. N. T., Elgin Station," in the JOURNAL of the 15th of February.

The present system gives us many examples similar to his witty "Bobtown," only much worse; moreover, it is highly provocative of profanity.

The "nuisance" is great, and could be easily remedied as "D. N. T." suggests. Very respectfully.

G. E. P.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

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JAMES D. REID, Editor,
Executive Rooms, Western Union Tel. Co.,
145 Broadway, New York.

NEW YORK, APRIL 1, 1872.

THE WORK OF THE YEAR.

During 1871, the Western Union Telegraph Company purchased over fourteen thousand miles of telegraph wire for the necessities of that year. Already eight thousand miles have been purchased for 1872, and the prospects are that over fifteen thousand miles of wire will be needed to meet the demands of the current year, which come pouring in from all quarters. Some will find it difficult to understand this, and what possible necessity there can exist for it. It is well they should know, although we have alluded fully to it in former years.

To those who have followed the course of the development of the country any explanation will be unnecessary. The railroad extensions of 1871 were over twelve thousand miles. In this item alone may be found the secret of telegraph extension. No road is secure now without a telegraph by its side. How often have we had to say this. The telegraph lines are the leading strings of the locomotive. The iron wire is the angel of the iron horse. So that, forever, they must go together, the gentle leading the strong, just as love rules the world. It is the old story. The rude man succumbs to the gentle woman. It seems poetic, but there is not a bit of poetry about it. It is all gospel, which has been, is now, and shall be, for ever and ever. Amen. So then, find out if you can how many iron roads are being opened up out on the vast territories towards which population is daily pushing. Examine the old railroad routes, how like new shoots on old trees, branches are being flung out on every side, and new arms to distant points are thrust forward to anticipate the march of rival interests. Day and night through all the year, and on both continents, the furnace fires are burning where the iron rail is being too slowly moulded for the orders of the contractor. So long as this lasts, new telegraph lines must be erected, and the orders for both go together.

But to this must be added wires to meet the enlarging demands of business. Every year multiplies the number of those who use the telegraph, and they who habitually u e it, use it more. Even in the face of an invention which bids fair to double the capacity of existing wires, fifteen thousand miles of new wire will be put in use by the Western Union Company before October next. Respecting all this we hope to give some valuable statistics in our next. It will be seen that neglect of the necessities of society, even where its forms are the most primitive and distant, is not a crime chargeable to the Western Union Telegraph Company.

We regret to be obliged to announce the serious illness of our venerable friend, Professor Morse. From the testimony of his physicians, his decease cannot be distant, and may be hourly expected. He has attained to a royal old age, and will depart full of honors. We shall miss his genial face and voice much, for we have loved him. We are glad of having been instrumental in honoring him, and rejoice with the thousands who united with us that the work was done before its subject passed away.

It is stated that a messenger boy connected with the Telegraph Company succeeded in inducing a capitalist to loan him money to invest in Erie, by which, during the recent excitement, he made $1,500. It would, perhaps, be deemed soft were we to commisserate this lad. This boy's success is, no doubt, regarded as a "big thing," which many will feel sorry they did not have pluck to imitate. It is possible that the lad may be wise enough to salt down this easily acquired money, and be content to pursue life hereafter with steady tread, contented with the fruits of honest labor. The chances, however, are against him. The probability is that the slow results of every-day life will not suit him, and that he will ultimately enter the ring of men who live on gambling, if his sudden success does not kill him before the time. The effect of his success on others must be even more pernicious than on himself. There has been too much of this already. We have watched its cursed influence on young men. At one time the condition of our telegraph offices inspired fear of a general debauchment. During the gold excitement of a few years ago, a state of things existed such as caused the utmost anxiety. Bad men found their way into telegraphic ranks, whose chief purpose was to act as confederates of outside parties, and debauch their companions. This great evil, we believe, is now happily removed. We want to see no renewal of it. Yet we shall not be surprised to learn that the success of this lad has caused many to try their hands at the risky game, only to come out of it stripped and corrupted. Stock gambling curses the heart, dries it up, debauches it, makes life a fever, hot, short, unblessed. Better, young men, be poor and pure, than to sell your soul to the stock exchange.

A correspondent asks us to explain the meaning of an *ohm*. We did this service four years ago, but gladly refer to it again.

The term "ohm" is derived from the name of a celebrated electrician, who first ascertained the laws of electrical resistance, and is used to denote a measure of resistance in the same way as an inch, or a yard, is a measure of length. The "ohm," as the unit of resistance, was adopted by a committee of the British Association of Electricians, and is now the acknowledged standard throughout Europe.

Mr. C. F. Varley, before the "ohm" was adopted, established a "unit" by observing the deflection of a galvanometer from a state of neutrality, when the resistance of a single mile of No. 16 copper wire was added to one side of the neutralized circuit. That deflection he designated as the "unit of resistance." The "ohm" is one twenty-fifth of Varley's unit, and, therefore, so much the more delicate. It represents the resistance of about two hundred and ten feet of No. 16 copper wire, or No. 8 galvanized wire, unexposed to disturbing causes, and in a temperature of 60° Fahrenheit.

What are its uses?

The "ohm" measurer is used for testing the resistance of magnet coils, arranging these at a common standard. Magnets of one thousand ohms resistance were detected by this efficient police, which were all but ruining important telegraphic circuits. In Great Britain all wires are tested by it every morning. Their proper condition being known and recorded, any deviation is at once detected. The deviation is expressed in "ohms," and when an operator could not tell by the change in his magnet that any fault existed, this delicate inspector discovers it at once.

It is used also to prove the resistance in batteries, to prevent the source of electric action from being its own chief impediment. It is the aim of all electricians to make the resistance of the battery and of the conductor to correspond, and not have the perfection of the one neutralized by the imperfection of the other.

It is used also in detecting impurities in the wire of magnet coils, and, in doing which, it has been especially useful. It has also compelled such a cutting out of bad joints as has largely redeemed the telegraphic operations of the country from a growing and very formidable source of embarrassment. In aiding the introduction of this instrument, Mr. Varley's visit to America was productive of most beneficent fruitage.

VALUE OF GALVANOMETER TESTS.

In reference to the use of these instruments we have received the following:

Nothing ought to be required to be said now as to the value of galvanometer tests of our wires, and, especially, for the purpose of locating breaks, crosses, escapes, &c.; and yet an occasional reference to actual results may not come amiss. A short time since two wires were found to be crossed nearly all day between stations A. and B. Repairers went over the line, without finding it, and were confident that it was not out of doors; but both A. and B. stoutly maintained that it was not in either of their offices. The cross came in and disappeared several times, and continued until the next day, when X. office tested with his galvanometer, and located the trouble in A. office, and soon after the manager of that office owned up, as follows:

"You have got me this time, sure. But trouble was not in the switch. Some one had thrown a very small piece of fine wire over the switch on to the lightning arresters. The wire was so small that it could not be seen. I discovered that by jarring the

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switch the cross would come in, and I tested it down to this piece of wire."

Now, a test with the galvanometer at first would have located the difficulty at least twenty-four hours sooner, and saved the valuable time of the wire, besides the lineman's labor. We hope soon to see the galvanometer in constant and general use, and no linemen sent after a trouble, when five minutes' accurate testing would locate the fault within a hundred yards. Let us use brains first, and muscle afterwards.

ARE THE FOOLS ALL DEAD?

This is April Fool's Day, and the question we use as a caption is answered by the coming of the anniversary day, when fooling comes in order, when the juniors, especially, delight in the process of entrapping the seniors into all manner of foolish positions. Yet as this process requires considerable brain, it cannot properly be considered the work of fools.

It is not very safe ground to tread upon, and some may resent the suspicion, yet we venture to ask "are there any fools connected with the Telegraph?" Don't get indignant about it. Let us talk it over.

Do you see that messenger boy? He has a good head. He has a good healthy body. His feet and hands are sound. He has the capital with which many a messenger has sprang to success and honor. But there does not seem much promise there. His hands are brown with dirt, his shoes are slouchy and soiled, he has a piece of tobacco in his mouth, his cap is torn and filthy, he stops on the curb to see every fallen horse, men receive messages from him and sign his book with a kind of detestation. That boy is a fool. He sees no future. He needs a friend to teach him the steps to future honor—to inspire him. The manager might make a man of him. Let him try. It is one of the opportunities of his position. It is a holy duty and delight for goodness to lift up the lowly and the bad.

There is an operator. Look at him. His desk is daubed with ink. His relay is covered with dust. His tariff book is incomplete. He is smoking a dirty meerschaum, and reading the *Sunday Mercury* or the *Police Gazette*. He has charge of an office, and he and the office are alike. His window is unclean, His floor is smudged. He receives customers with his hat on, and his pipe in his mouth. His answers are repellant—his action indifferent. The anxiety of this feeble woman, who is sending a message to her boy, don't disturb him. He is a fool. He don't understand his duty to himself. He don't see what a blessing he could make himself, or how he is lowering a grand business. Won't some one tell him? It might make one fool the less. Don't dismiss him till you try.

There is another fool. He would not take patience to learn his work, gets an idea how letters are made, and thinks he knows all. So he is daily causing mistakes and making them. Precision is unknown to him, deems it talent wasted. So he shuffles his way for awhile, and then comes "John Brown, of Sleepy Hollow, dismissed for incompetency." This class of fools are too numerous. The civil service plan must go in force on such fellows. Put them to a paper machine, and make them write a paragraph of one hundred words with mathematical accuracy. That will bring these slip-shod youths to their marrow.

The biggest fool is the man who comes on our monthly report as "dismissed for drunkenness." We know the name. He is one of the most skilled of operators. He has a good heart, at least has the credit of it. But the smell or the dream of rum makes him hasten to where debauching by rum-selling and rum-drinking is genteel. So he charges himself, fires up, returns to his desk to send the most important of human communications, where fortune or life hangs by a thread, and are now in the hands of a man hot with whiskey. Out with him! Pity stops in such a case outside the office door, and waits until its object reaches the street's fresh air. Hustle the drinkers out, every soul of them. Better yet, never let them come in. We favor a premium to men who enter the service pledged against rum.

Of other fools, more anon.

THE *Handicraft* is a new Scientific Journal which comes to us, bearing upon its face promise of success. It is edited by our good friend Prof. John Phin, well known in connection with the editorship of Scientific Journals in New York, a fluent writer and thoroughly posted. We wish *Handicraft* abundant success, and we expect to scissor it freely.

From Chicago we have the following inquiry:

How many words are there in the following message:

"Buy five hundred New York Central stock."

We answer that there are seven.

NEW INVENTION.

The Girard (Pa.) *Cosmopolite* says that, at a certain station on the Philadelphia and Erie Railroad, the company has a new night telegraph operator who, if inclined to slumber, is too ingeniously wide-awake to be caught napping at his post. Recently he was seized with drowsiness, which he could not shake off. As it was his duty to report all passing he dared not yield, and yet could not resist. Necessity at length suggested an alarm signal, which he proceeded to put in operation, by suspending a scuttle full of coal by means of a cord which was passed through the key-hole of his office door, and fastened across the track at the requisite elevation. He then resigned himself to rosy dreams, which were interrupted by a passing train, the engine of which snapped the cord, causing the coal scuttle to come down with a noise that effectually roused him to his duty.

ALL hail to electricity! Not content with the blessing it has already conferred upon the world, it has achieved a new triumph. Already employed to restore vigor to the gouty limbs of decrepit *bon vivants*, a French physician has recently shown that electricity is an efficient remedy for the evil effects of drinking on the human nose. Doctor Bernier claims that by the application of an electric current to noses even of the most bacchanalian hue, the flesh may be made "to become again as the flesh of a little child;" and he supports his assertion by a cure performed on the proboscis of a patient of his own, a woman (let it be told in a whisper); and not only that, but one of high rank. A pocket battery will prove as great a necessity, and almost as valuable as a pocket book; and no longer need the tippler of high rank or low degree carry a lighthouse about with him, or bear an appendage that has no faint resemblance to the last or the first "rose of Summer."

LONDON SOCIETY OF ARTS.

This Society, after discussing the question of the purchase by Government of the great ocean cables, have published a report, much of which is without special significance, which concludes as follows:

"It is confidently submitted that the measure proposed, which is doubtless one of easier accomplishment than that of the purchase of the inland telegraphs of trading companies, commends itself to the immediate and special support of those engaged in the Arts, Manufactures, and Commerce of our colonies, of our Indian possessions, and of the American continent, for the removal of the existing clogs, and for the prevention of increased clogs of expense, particularly in competition with the advanced administrative arrangements on this subject of the Continental States."

By order of the Council.

P. LE NEVE FOSTER, Secretary.

A FEW years ago, at the time of the completion of the telegraphic line to the Mountain House, for a few days strong winds prevailed, causing that peculiarly loud humming noise of the wires under such circumstances. At length the wind died away, and the telegraphic Æolian harp was mute. Several days thereafter, the proprietor of the Mountain House, on his way to Catskill, reined up in front of the Half Way House to water his horses, when he was accosted by the Kiskatom landlord: "How's things on the mountain?" "Lively," was the response. "Ain't doin' much telegraphin', are you?" "O, yes; the line is quite well patronized." "Well, I didn't think so; *I ain't heerd a dispatch go up in three or four days.*"—*Catskill Recorder.*

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY.
145 Broadway, New York,
April 1, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since March 15, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

428 Aullville, Mo.
151 Beaver Station, Pa.
298 Beecher, Ill.
246 Cartersville, Ga., re-opened.
418 DeWitt, Mo.
210 Elba, Lapeer Co., Mich.
348 Edwardsville Crossing, Ill., re-opened.
14 Freeport, Me., ck. Brunswick, Me. Heretofore an Other Line office.
41 Fanwood, N. J., ck. Plainfield, N. J.
298 Grant, Kankakee Co., Ill.
76 Goldsboro', York Co., Pa.
52 Greenbrook, N. J., check Bound Brook, N. J.
308 Hoopston, Ill.
308 Lovejoy, Iroquois Co., Ill.
298 Momence, Ill.
32 Norfolk, Conn.
298 Papineau, Ill.
21 Somerville, Mass.
338 Tilden, Ill.
211 Waltz, Mich.
281 Whitestown, Ind.

OFFICES CLOSED.

Armstrong Run, Pa.; Nameoki, Ill., and Natasulga, Ala.

GENERAL INFORMATION.

The name of the office heretofore known as Pile Falls, Pa., has been changed to Falls City, Pa.; that of Spruce Run, N. J., changed to Glen Gardner, N. J., and that of New Market, N. J., changed to Dun Ellen, N. J.

Business for Dun Ellen, N. J., should be checked to Plainfield, N. J.

The following offices will hereafter be checked direct: Abington, Montgomery Co. Pa.; Cranford, N. J.; Pomona, N. J., and Glen Gardner, N. J.

The P. O. address of Washington, R. I., is Coventry, R. I., and of Abington, Montgomery Co., Pa., Waverly Heights, Pa.

The Western Union office at Tionesta, Pa., has been again re-opened. Business will therefore be checked direct.

OFFICES HAVING "SPECIAL SHEET A,"

Will hereafter use their "special rate" to Brunswick, Me., for tariff to Freeport, Me., and check Fair Haven, Conn., same as "special rate" to New Haven, Conn.

WILLIAM ORTON, Pres't.

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TELEGRAPHERS' MUTUAL LIFE INSURANCE.

At the special meeting called to elect a new Treasurer on the 21st instant, there was an unusually large attendance, and Mr. A. S. Brown was unanimously elected Treasurer from April 1. This is an election eminently fit to be made, and is the greatest assurance which could be given of success.

We regret that the unusual pressure upon Mr. Applebaugh and ourself, caused by the recent deaths of which we now make mention, prevents the publication of the large list of receipts which will appear in our next issue. We will at that time give a complete statement of the condition of the Association.

DEATH OF JOHN GRANT.

Death is reaping his usual spring harvest. We have to announce the death by consumption of Mr. John Grant, formerly manager of the Guelph, Ontario, Montreal Telegraph Company's office, at Atlanta, Ga., where he had gone to make a last effort to recover his health. He died March 3d, and was buried in Guelph March 10th. He leaves a wife and two children. We only received notice of Mr. Grant's decease March 19th, from Mr. James Bryce, Manager, Guelph. This calls for

ASSESSMENT No. 28

on all certificates up to 1447, inclusive, and the call will be regarded as issued April 1, 1872.

MISS E. SAMMIS.

It is with heartfelt sorrow that we record the death of one of the truest and noblest of women, Miss E. Sammis, of Quarantine Station, Staten Island, who died March 24th, at Williamsburg, of tumor in the throat, causing death by strangulation. One week before her death she wrote the following note to the Secretary. Every dollar she ever sent to us was accompanied by just such words of cheerfulness and gratitude. Many will remember them, for we published several. Poor girl! she did her duty nobly and well. She is now in God's good care. The day of toil is over, and she rests evermore. She is the first of the Sisters of the Association who has died.

W. K. APPLEBAUGH, ESQ., *Secretary.*

Enclosed please find two dollars to meet assessments numbers 26 and 27. Death is dealing his blows silently but surely all around us. Let us be thankful for the means of relief and comfort which a connection with our Association affords, and gladly and quickly as our means permit respond to these Heart Calls. Very truly yours,

E. SAMMIS.

BROOKLYN, March 17, 1872.

We have received the following from one who knew Miss Sammis well:

NEW YORK, March 26th, 1872.

J. D. REID, ESQ.:

Dear Sir:—I have just heard of the death of Miss Emma Sammis, Manager of the telegraph office at Quarantine, Staten Island.

From my long acquaintance with her I cannot refrain from saying a few words in regard to her now that she has passed away.

She commenced telegraphing at Hicksville, Long Island, more for amusement than profit, the family being then in good circumstances, about 1856 or '57. They were, however, burned out a few years after, and the loss was so heavy that they were obliged to give up their little property, and the support of the family, in a great measure, through the infirmities of her father, devolved upon this daughter. She has attended to her arduous duties cheerfully, unflinchingly, and faithfully.

She was always happy in her religious convictions; relying most implicitly in the Saviors' promise to all who should trust in him. She was as guileless as she was sincere, and she has entered into and is now enjoying her reward. W.

This will call for

ASSESSMENT No. 29,

and we trust will be the last for some time to come. We hope it will be met all the more promptly, because of the fact, that Miss Sammis was the first of the sisterhood to fall from the ranks.

SAN FRANCISCO, February 15, 1872.

NEW MATERIAL FOR TELEGRAPHIC USE.—Our correspondent at Camptonville writes: "During the recent heavy blow in the mountains the telegraph lines in the neighborhood of Camptonville were sadly demoralized and strewn over the country in rather a mixed manner. A good friend of the operator, probably a miner, willing to aid in putting things to rights, voluntarily repaired the line in his neighborhood. Having no wire, he used the next best material he could find, which happened to be a piece of fuse. With this he made a very artistic connection, leaving the line, in appearance as good as ever. Unfortunately it wouldn't work. The repairers from town traversed the line from office to office and pronounced it O. K. Still no current. The repairers started again, wallowing through the snow, blessing their luck and the line, and closely scanning each joint. The fuse was found, cut out, and communication restored. The operator prays now 'deliver me from my friends.' Head office says, 'gross negligence on your part Mr. De Biz.' Our mining friend is convinced now that fuse won't always work. 'Dog on 'em,' they put in powerful weak powder."

The following is old, but has not appeared in the JOURNAL:

TICK-LISH TELEGRAPHING.—Two young men, telegraph operators, boarding at one of our leading third-class hotels, find great amusement in carrying on conversation with each other at the table by ticking on their plates with knife, fork, or spoon. A combination of sounds or ticks constitutes the telegraphic alphabet, and persons familiar with these sounds can converse thereby as intelligently as with spoken words. A few days ago, while these fun-loving youths were seated at breakfast, a stout-built young man entered the dining room with a handsome girl on his arm, whose blushing countenance showed her to be a bride. The couple had, in fact, been married but a day or two previous, and had come to San Francisco from their home in Oakland, or Mud Springs, or some other rural village, for the purpose of spending the honeymoon. The telegraphic tickers commenced as soon as the husband and wife had seated themselves.

No. 1 opened the discourse as follows: "What a lovely pigeon this is alongside of me—ain't she?"

No. 2.—"Perfectly charming—looks as if butter would not melt in her mouth. Just married, I guess? Don't you think so?"

No. 1.—"Yes, I should judge she was. What luscious lips she's got! If that country bumpkin beside her was out of the road, I'd give her a hug and a kiss just for luck."

No. 2.—"Suppose you try it, anyhow. Give her a little nudge under the table with your knee."

There is no telling to what extent the impudent rascals might have gone, but for an amazing and entirely unforeseen event. The bridegroom's face had flushed, and a dark scowl was on his brow during the progress of the ticking conversation; but the operators were too much occupied with each other to pay any attention to him. The reader may form some idea of the young men's consternation when the partner of the lady picked up his knife, and ticked off the following terse but vigorous message: "This lady is my wife, and as soon as she gets through with her breakfast, I propose to wring both your necks, you insolent whelps." The bridegroom was a telegraph operator, and "knew how it was himself."—*San Francisco Chronicle.*

THE SONG OF THE POLES.

MACKINAW, Ill., March 11, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—In the JOURNAL of March 1, I notice a question asked by "Young Operator," relative to the cause of the humming noise of the line at telegraph poles, &c. I also notice that your answer is "Simply vibration of the wire, caused by winds, &c."

If this noise is occasioned by winds, why is it that the greatest noise occurs during still clear sharp cold nights during winter, and that during the hardest winds there is no noise at all? For instance, yesterday the wind blew from the North—our line runs East and West, and there was no noise perceptible. Think you are mistaken in the matter. I notice that from one to three days before a storm, this humming noise commences, and is kept up until the atmosphere changes, when the noise ceases. Is it not the action of the electricity of the atmosphere on that of the line, that causes it? I would also like to ask if there is any remedy or invention that will stop this noise, where the line is fastened to the house; a common insulator will not do it. I also notice that where loop wires are run into an office, through tubes, that the noise is greater than when gutta-percha covered wire is used, and simply run through holes and wedged with pins.

Respectfully &c., OLD OPERATOR.

If "Old Operator" will take an œlian harp, such as are placed under the sash of a window, he will find that drawing the strings tight will destroy the sound. Heavy winds do this with the wire. The wire responds to the action of remote storms upon it, just as men working upon the wire can be heard at any office many miles distant. Compartively moderate winds produce the sounds heard at telegraph poles and windows. The sounds can be stopped altogether by resting the wire on gutta percha, or any elastic substance.

KIND WORDS.

CHARLOTTE, N. C. Feb. 26, 1872.

To the Editor of the Journal of the Telegraph:

Dear Sir:—I regret to see it announced that you have determined to sever your connection with the JOURNAL OF THE TELEGRAPH. I have not, it is true, had the pleasure of meeting you personally, but judging from your "thoughts on paper," your words of cheer and encouragement, your endeavor to raise the morals of the profession to a higher standard, to make duty a pleasure, words and efforts that have not been in vain.

With my best wishes for your future welfare and happiness, I am, yours, G. H. KING, Manager.

BOSTON, February 27th.

To the Editor of the Journal of the Telegraph:

The many friends of Mr. J. Perley Munroe, of Concord, N. H., for three years past, night report operator, at Worcester, Mass., will be pleased to learn of his appointment as City Editor of the *Worcester Daily Spy.* Mr. Munroe entered upon his new position, March 1st, his Telegraphic Mantle falling upon Mr. P. L. Ryder, whose promotion to the position lately filled by M. Munroe is a merited recognition of three years faithful services in the Worcester Office. By the resignation of Mr. Munroe, one of the best operators and truest *men* in the fraternity is lost to the Telegraph service. BOSTONIA.

MARRIED.

SHULTZ—KILLIAN.—On Thursday evening, March 14th, 1872, in Elizabethtown, Pa., by the Rev. F. W. Weiskotten, H. T. Shultz, Manager P. R. R. & W. U. Telegraph Office, Elizabethtown, Pa., to Fianna Killian, of the same place.

MILLER—MANCHESTER.—At Charles City, Iowa, Monday evening, March 4th, 1872, Mr, Edward O. Miller, of St Ausgar, Iowa, Express operator W. U. Telegraph Co., to Miss Nettie E. Manchester, of Osage, Iowa.

BORN.

BUSH.—To W. T. Bush, Manager W. U. Telegraph Office, Franklin, Louisana, February 23d, a Son, weighing ten pounds.

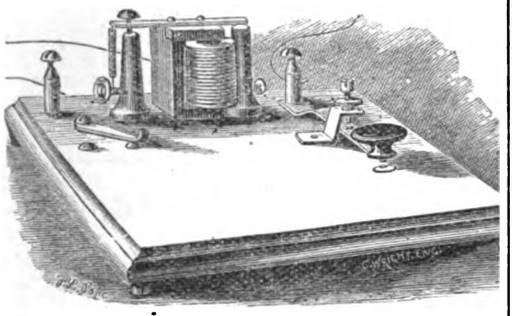
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To Make a Cheap Microscope.—Take a slip of thick paper or card-board, and punch a small round hole in it, not larger than an ordinary slate pencil. (The paper must be firm and even, and the hole truly circular, with a smooth edge all around, to ensure success. The cover of a small pill-box will do very nicely, as in using it the rim will help to exclude the extraneous light.) Then take a drop of the purest water on the end of a pencil and insert it carefully in the hole of the paper, and withdraw the pencil as gently as possible, leaving the drop of water in the hole. The water should not be allowed to spread the least over the surface of the paper; it will then assume the shape of a double-convex lens, and if properly constructed it may have a magnifying power of 20 or 30 times. To use it, it should be held as close to the eye as possible, and the object to be viewed brought quite close to the lens; the proper focal distance will soon be ascertained. The hole must not be made too large, or the weight of the water will destroy its lenticular form; for the same reason and to prevent too great convexity, the quantity of water must be limited; while too small a quantity will not give a sufficient magnifying power.

Electricity and Altitude.—M. Matteucci has found that if the surface of the earth at different altitudes be connected by a conductor, a constant current of electricity will flow from the lower to the higher point; the intensity of the current increasing with the difference of the altitudes. Thus, between Florence and Turin the deflection of the galvanometer from the current passing through it was from 15 to 20 degrees; between Pontedera and Volterra, from 20 to 25; and between Aoste and Courmayeur, from 40 to 50. Atmospheric changes, however, modify, of course, the effects, as do also diversities of latitude and geological formation. The aurora borealis and the variations of terrestrial magnetism are supposed to have an intimate relation with this distribution of electrical conditions.

THE NONPAREIL TELEGRAPH APPARATUS.

(Patent applied for.)



This apparatus supplies a want which has long been felt, viz.: that of a SIMPLE and CHEAP

MORSE TELEGRAPHIC INSTRUMENT,

with all the necessary Batteries and other appurtenances in a CONVENIENT and COMPACT form.

By means of a switch, which is now placed on each instrument, they can be worked as desired, either as the open or the ordinary continuous, or closed circuits.

It is intended especially for the use of

STUDENTS, AMATEURS, AND OPERATORS,

but will be found to be equally well adapted for use on

PRIVATE TELEGRAPH LINES,

or Short Lines of any description, which are not over three or four miles in length.

A NEW FORM OF BATTERY

is employed, which is compact, efficient, and economical, and especially adapted to the purpose for which it was designed. Each instrument will be accompanied by a

BATTERY, CHEMICALS, INSULATED WIRE

for connections, together with an

ILLUSTRATED BOOK OF INSTRUCTIONS,

which in itself forms a complete elementary treatise upon the ART OF TELEGRAPHY.

PRICES:

Single Instrument, complete, with Batteries, etc.....$8 00
Two Instruments, " " " " 15 00

Sent by Express on receipt of price.

Remittances may be made by Post Office Order, Registered Letter, or Draft payable to our order. Persons ordering Instruments will please write plainly, giving Post Office, County, and State, with instructions for shipment. Address,

F. L. POPE & CO.,
P. O. Box 6010. 80 Broadway, (Room 51,) New York.

The Nonpareil Telegraph Apparatus may be procured through the leading dealers in Telegraph Supplies throughout the country.

☞ SEND FOR A CIRCULAR. ☜

16,000 MILES

OF

"JOHNSON'S" WIRE

USED BY THE

TELEGRAPHS OF THE UNITED STATES

DURING THE YEAR 1871.

This is sufficient refutation of all the intimations thrown out by the Manufacturers and Importers of other Wires, reflecting upon the acknowledged superiority of the Wire manufactured by

Messrs. RICHARD JOHNSON & NEPHEW,

MANCHESTER, ENGLAND.

Their Works are the Largest in the World.

The great advantage which they possess over other manufacturers is their patent process of drawing Wire in great lengths (averaging 1,200 feet).

All Telegraphers know that, in nine cases out of ten, breaks in Wire occur at joints, hence the less joints the fewer breaks.

Messrs. Richard Johnson & Nephew furnish three-fourths of all the Telegraph Wire used by the

ENGLISH GOVERNMENT.

This Wire is necessarily subject to the tests, etc., imposed by the English Post-office Department.

A large stock always on hand and for sale at the lowest market prices—both free and in bond.

TELEGRAPH LINES

OF ANY LENGTH FULLY EQUIPPED WITH

Wire, Insulators, Batteries, Instruments, &c.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET,

NEW YORK.

Sole Agents for "Johnson's" Wire.
" " " American Compound Wire.
" " " Cauvet's Patent Screw Insulator.
" " " Sam'l C. Bishop's Insulated Wires and Cables.
" " " Brooks' Patent Paraffin Insulators.

Manufacturers of every description of

TELEGRAPH APPARATUS.

CALLAUD BATTERY,

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Orders filled by

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CHARLES WILLIAMS, Jr.,

109 Court St., BOSTON, MASS.

AND BY

GRAY & BARTON,

Agents for the United States,

479 State St., Chicago, Ill.

AMERICAN FIRE ALARM

AND

POLICE TELEGRAPH.

GAMEWELL & CO., Proprietors,

NO. 104 CENTRE STREET, NEW YORK.

J. W. STOVER,
General Agent and Superintendent.

L. B. FIRMAN, Chicago, Ill.,
General Agent for the West and North West.

J. R. DOWELL, Richmond, Va.,
Special Agent for Virginia and North Carolina.

J. A. BRENNER, Augusta, Ga.,
Special Agent for Georgia and South Carolina.

L. M. MONROE, New Canaan, Conn.,
Special Agent for New England.

This system of Fire Alarm and Police Telegraph, with a Central office, or upon the

AUTOMATIC PLAN,

is now in operation in the following cities, to which reference is made for evidence of its great SUPERIORITY, VALUE and UNIFORM reliability:

Albany, N Y.,	New Orleans, La.,
Alleghany, Pa.,	New Haven, Conn.,
Boston, Mass.,	Newark, N. J.,
Buffalo, N. Y.,	Omaha, Neb.,
Baltimore, Md.,	Philadelphia, Pa.,
Chicago, Ill.,	Pittsburg, Pa.,
Cincinnati, Ohio,	Portland, Me.,
Columbus, Ohio,	Peoria, Ill.,
Cambridge, Mass.,	Providence, R. I.,
Charlestown, Mass.,	Quebec, L. C.,
Covington, Ky.,	Rochester, N. Y.,
Detroit, Mich.,	Richmond, Va.,
Dayton, Ohio,	Indianapolis, Ind.,
Elizabeth, N. J.,	St. Louis, Mo.,
Fall River, Mass.,	St. John, N. B.,
Fitchburg, Mass.,	Springfield, Mass.,
Hartford, Conn.,	San Francisco, Cal.,
Jersey City, N. J.,	Savannah, Ga.,
Louisville, Ky.,	Syracuse, N. Y.,
Lawrence, Mass.,	Troy, N. Y.,
Mobile, Ala.,	Toledo, Ohio,
Montreal, Canada,	Toronto, Canada,
Milwaukee, Wis.,	Washington, D. C.,
New York City,	Worcester, Mass.,
Lynn, Mass.,	New Bedford, Mass.,
Lowell, Mass.,	Bridgeport, Conn.

The distinctive features of these systems of

FIRE ALARM AND POLICE TELEGRAPHS,

ARE,

First—The Automatic Signal Boxes, the simple electro-mechanism of which enables any one—even a child—to give an *instantaneous, general,* and *definite* alarm of fire.

Second—The Automatic Repeater, through which the apparatus may be distributed in a combination of circuits, and the entire system successfully worked without the constant personal attention of either operators or watchmen.

Third—The Electro-Mechanical Bell Strikers, adapted to produce the full tone of the largest church or tower bells.

Fourth—The Electro-Mechanical Gong Striker, for hose and engine houses, by means of which the location of the fire is instantaneously communicated to the members of each fire company.

These features combined form the

ONLY PERFECT, COMPLETE, AND RELIABLE SYSTEM

OF

FIRE ALARM TELEGRAPH IN THE WORLD.

Messrs. GAMEWELL & CO. are the owners of the original *FARMER AND CHANNING PATENTS,* one of the most important of which has just been extended for seven years. During the past seventeen years they have spared no expense or effort to secure improvements, and the systems are now covered by

MORE THAN TWENTY PATENTS.

The introduction and operation of the

AUTOMATIC SYSTEM

involves so little expense, compared to the benefit which it confers, that even small communities can profitably adopt and maintain it.

The co-operation of TELEGRAPHERS in securing its introduction into their localities is cordially invited, and their efforts will be duly appreciated and compensated.

Any information desired in regard to the above system will be cheerfully and promptly furnished upon application at the office.

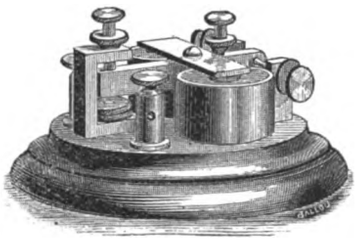
A pamphlet setting forth more fully its advantages and superiority, has been printed, and will be supplied to Municipal Authorities and others interested in Fire Alarm and Police Telegraphy upon application as above.

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M. A. BUELL,

Manufacturer and Dealer in all kinds of

Telegraph Supplies.



A VERY FINE NEW STYLE

SMALL SOUNDERS,

Polished Rubber Covered Magnets, $6.00.

The same, on Mahogany Base and Silver Plated, . . . $9.00

Agent for

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AND

PUTT & CO.'S MECHANICAL INSTRUMENTS

FOR LEARNERS.

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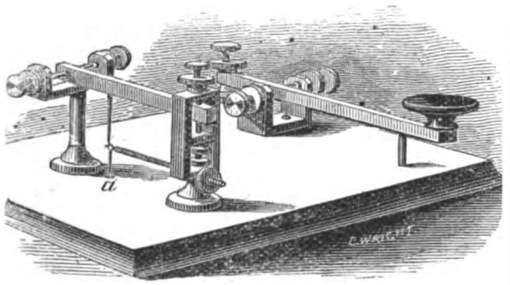
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Parties ordering instruments, from points except well-known cities, will please give the name of county and State.

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PROFESSOR MORSE

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Cedar Holders, for Desk		$0 50
Ebony " "		0 60
Cedar " "	Ex. Plated	0 75
Ebony " "	Nickel Plated	1 00
Pocket Holders, Plain,	" "	1 75
" "	Chased, Ex. Plated	2 00
Six Cedar Desk Holders to one order		2 00

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OPINIONS.

NEW YORK, March 15, 1871.

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FRANK L. POPE,
Associate Editor of the "Telegrapher."

NEW YORK, April 21, 1871.

I fully accord in the above opinion of the Self-Supplying Pen-Holder, having tested it for some time.

SAMUEL F. B. MORSE.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 10. NEW YORK, APRIL 15, 1872. WHOLE NO. 107.

MORSE.

"What hath God wrought?"

As like the setting sun, and darkness gathers round,
All nature sinks in sweet repose and rest;
So thy frail body sinks in hallowed ground.
The Genius of the Age, by all confessed.

Oh, wondrous mind! Oh, man of patience rare!
Hope, in fruition sweet, o'erwhelmed thy fears,
And nations placed their honors on thy brow,
And seek thy tomb with heavy hearts and tears.

"What hath God wrought?" For thee, O Morse, a name
That evermore, throughout all time, shall stand;
The burden of thy gifts, on scrolls of Fame,
Shall live forever, and in every land.

April 5, 1872. HENRY C. COOPER.

DEATH OF PROFESSOR MORSE.

As we feared, when our last issue went to press, the good old man whose presence often hallowed our work, has passed away. Professor Morse died at 8 P. M., Tuesday, April 2d, at his residence, No. 5 West 22d Street, New York. The particulars connected with his last illness which are of any interest are so tenderly introduced in the funeral address of Mr. Morse's pastor, Dr. William Adams, which we publish in full, that we make no other reference thereto. His death was beautiful in its sweet serenity, in its heavenly peace, in its unclouded vision. Even in the state of apparent unconsciousness there were not lacking evidence, that the intellect retained its life royally to the close. We trust no one who receives this paper will lay it aside until the touching address of Dr. Adams is read. We only wish that there could be transferred to the printed lines the deep pathos, the voice in which the heart was so regnant as to make articulation occasionally uncertain and tremulous, and the fine dignified form of the reverend mourner as he uttered these last words of sacred affection over the body of the man he loved.

It seems unnecessary for us to recapitulate the facts of Mr. Morse's life and yet it seems a fitting time to refer briefly to them.

April 27, 1791, within sight of Bunker Hill, Samuel Finley Breese Morse was born. He was the son of Rev. Jedediah Morse, D. D., author of that many-volumed series of text books from which the passing generation studied geography. His historical works, also, are numerous. He was a graduate of Yale, 1783, and it was to Yale that he sent the boy Samuel, who graduated thence in 1810, in company with Gov. Ellsworth of Connecticut, President Hasbrouck of Rutgers, Prof. Chauncey A. Goodrich, Prof. Ebenezer Kellogg and other distinguished men. His first bent was toward engineering, but immediately after graduation he decided upon the life of an artist; so went to England with Washington Allston in 1811, becoming then a pupil of Benjamin West.

In 1818 he exhibited at the Royal Academy his "Dying Hercules," and in May of that year a plaster model of the same which he had made in preparing for the picture, won the gold medal of the London Adelphia Society of Arts. This success encouraged him to compete for the premium for historical composition. The picture painted for this purpose was "The Judgment of Jupiter," between Apolla, Marpessa, and Idas; and West is authority for saying that it would have won the prize had not his departure from England withdrawn it from competition under the rules. In 1819, he returned, settling in Boston, afterward going to New Hampshire and getting $15 the head for portraits. Thence at the solicitation of friends in 1822, he came to New York. The city of New York gave him a commission for a full-length likeness of Lafayette, and orders poured in. In 1826 the National Academy of Design was formed, growing out of a drawing association started in 1824, Mr. Morse taking an active part in the organization, and being elected its first president. This position he held for sixteen years. The first course of art lectures delivered in America was before the New York Athenæum. One of his important paintings is a large picture of the House of Representatives of that day, with numerous portraits.

In 1829 he started again for Europe, staying three years. While in Paris he painted a picture of one of the Louvre galleries, copying the chiefly notable paintings on the walls in miniature. His election to the chair of the Literature of the Arts of Design in the University of New York recalled him, and in October, 1832, he sailed from Havre in the packet ship Sully. There was the birthplace of the Morse electric telegraph.

At college he had devoted much time to the study of chemistry, under the supervision of Professor Silliman, and even in after years the phenomena of electricity, and of electro-magnetism had been to him a source of considerable speculation, and had been the source of frequent conversation with his friend Professor J. F. Dana. During the present voyage from Havre to New York, the conversation turned accidentally on this subject, in connection with a discovery that had shortly before been made in France, of the corelation of electricity and magnetism.

During all the years of his artist life he had retained his early love for science, and usually kept himself well informed of its progress. Hence he eagerly entered into the conversation which thus sprang up.

"Why," said he, "if that is so, and the presence of electricity could be made visible in any desired part of the circuit, I see no reason why intelligence might not be transmitted instantaneously by electricity."

"How convenient it would be," added one of the passengers, "if we could send news in that manner."

"Why can't we?" asked Morse, fascinated with the idea.

From that time the subject occupied his thoughts, and he began forthwith to exercise his Yankee ingenuity in devising the requisite apparatus. It is stated by a distinguished biographer that "before the Sully dropped her anchor in New York harbor, he had invented and put on paper, in drawings and explanatory words, the chief features of the apparatus employed, to this hour, by far the greater number of telegraph lines of the world. The system of dots and lines, the narrow ribbon of paper upon a revolving block, and a mode of burying wires in the earth all were thought of and recorded on board of the packet ship. Except the idea of suspending the wire on posts, the essential devices of the invention were completed on that vessel. A few days after landing the plan of supporting the wires on posts was thought of, though he still preferred his original conception of the buried tubes. Science had before Morse done her part. It remained for the inventor to devise an apparatus which would utilize scientific truth, and Samuel Morse was the man."

Of course the invention of the telegraph was, like all the greatest things, in some measure a growth, but the world has recognized Prof. Morse as at least the contributor of the greatest share of the origination, and the one successful promoter of its realization. His first idea was to pass a strip of chemically prepared paper in contact with the wire, decomposing the chemicals so as to form marks of different lengths which should form a sign alphabet. Next he thought of the action of electricity upon a lever as a mode of using pens and ink, but this he abandoned for the indenting steel point on the end of a lever which is now in use. In 1835 he completed a rude apparatus, all made by himself, with an experimental wire of half a mile around a room, but this only transmitted in one direction. By 1837 he had ready an improved apparatus, which he exhibited at one of the rooms in the University. This year he went to Washington, filed his caveat, and asked for a Congressional appropriation for a line thence to Baltimore. The session passed without action, and he went abroad. England refused him a patent, Wheatstone having in the meantime got to work; in France he obtained a *brevet d'invention*. But he met with little encouragement abroad, and came back to struggle through poverty and ridicule for four long years. Session after session he persevered. His bill was amended by Congressional wits to include experiments in mesmerism and *Millerism*, the chair refusing to rule out the absurd amendment on the plea that "it would require a scientific analysis to determine how far the magnetism of mesmerism was analogous to that to be employed in the telegraphs." At last came the close of the session of '43. On the evening of March 3, the Professor gave up all hope of immediate success in Congress, and returned to his hotel, to start for New York the next day. "At the midnight hour of the expiring session," by a vote of 89 to 83, the bill was passed, and in the morning the inventor knew the dawn which follows the darkest hour.

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In reference to this period we clip the following from *Harper's Monthly* of January, 1862:

During the entire last day of the session Mr. Morse watched the course of legislation from the gallery with an anxiety probably shared by few of the eager expectants who, from their places in the gallery above, hung with anxious solicitude upon the action of the measures in which they were especially interested upon the floor of the Senate. At lenght, worn out by the interminable discussion of some Senator who seemed to be speaking against time, and overcome by his prolonged watching, he left the gallery at a late hour and returned to his lodgings, under the belief that it was not possible his bill could be reached, and that he must again turn his attention to those labors of the brush and easel by means of which he might be enabled to prosecute appeals to Congress at a future time.

He accordingly made his preparations to return to New York on the following morning, and retiring to rest, sank into a profound slumber, from which he did not awake until a late hour on the following morning. But a short time after, while seated at the breakfast-table, the servant announced that a lady desired to see him. Upon entering the parlor he encountered Miss Annie Ellsworth, the daughter of the Commissioner of Patents, whose face was all aglow with pleasure.

"I have come to congratulate you," she remarked, as he entered the room, and approached to shake hands with her.

"To congratulate me!" replied Mr. Morse, "and for what?"

"Why, upon the passage of your bill, to be sure," she replied.

"You must surely be mistaken; for I left at a late hour, and its fate seemed inevitable."

"Indeed, I am not mistaken," she rejoined; "father remained until the close of the session, and your bill was the very last that was acted on, and I begged permission to convey to you the news. I am so happy that I am the first to tell you."

The feelings of Mr. Morse may be better imagined than described. He grasped his young companion warmly by the hand and thanked her over and over again for the joyful intelligence. "As a reward," concluded he, "for being the first bearer of the news, you shall send over the telegraph the first message it conveys."

"I will hold you to that promise," replied she. "Remember."

"Remember," responded Mr. Morse; and they parted.

By the month of May, 1844, the whole line was laid, and magnets and recording instruments were attached to the ends of the wires at Mount Clare Depot, Baltimore, and at the Supreme Court Chamber, in the Capitol at Washington. When the circuit was complete, and the signal at the one end of the line was responded to by the operator at the other, Mr. Morse sent a messenger to Miss Ellsworth to inform her that the telegraph awaited her message. She speedily responded to this, and sent for transmission the following, which was the first formal dispatch ever sent through a telegraphic wire connecting remote places with each other:

"WHAT HATH GOD WROUGHT!"

The original of the message is now in the archives of the Historical Society at Hartford, Connecticut.

In 1842 the first submarine cable was laid by him—across New York harbor—winning the gold medal of the American Institute. Mr. Morse's letter to the Secretary of the Treasury, 10th of August, 1843, contained the first suggestion of the Atlantic telegraph. Honors were poured in upon him. In 1851 a convention to select a uniform system for all Germany, adopted his; in 1857 the representatives of the chief European powers, assembled at Paris, presented him with 400,000 francs on account of his invention. Yale made him a doctor of laws. France enrolled him in her Legion of Honor. Austria, the German States, Denmark, Turkey, gave him their highest honors. His fame followed the wires till the globe was girdled.

He has also been the recipient of honorary banquets in London, Paris and in this city. One of the latest honors paid to him was the erection of his statue in Central Park, last Summer. At that time delegates from the telegraphic fraternity of the entire country assembled in this city, to do honor to the man who had done so much for his race. Dispatches were received from Calcutta, from San Francisco, and from hundreds of other intermediate places, all uniting in the general strain of thanks and gratulation. On the 22d of last February he was selected as the fittest one to unveil the statue of Franklin in Printing House-Square, after which time he was very rarely seen in public. Prof. Morse was twice married; and his private life was one of almost unalloyed happiness. He resided during the Summer at Poughkeepsie, in a delightful country-house on the banks of the Hudson, surrounded by everything that could minister to his comfort or gratify his tastes. In the winter he generally lived in New York. By those who have examined into the question, it is reported that the first idea of a sub-marine cable to Europe emanated in the brain of Prof. Morse, in which case there is little connected with telegraphy of which he may not be said to be the author.

Mr. Morse, after a life of great activity, intermixed with no little personal annoyance and many pleasant remembrances, at the age of seventy, retired from the active duties of life, and devoted himself to the gratification of the tastes of a cultivated gentleman, and the exercise of a generous hospitality. His country residence, situated in a most picturesque spot, amidst deep ravines and lofty forest trees, upon the banks of the Hudson, a short distance from the town of Poughkeepsie, is built in the Italian style of villa architecture, and contains a high tower, and extensive piazzas clustering with vines and flowers.

In this delightful spot, adorned with all the chasteness of an artist's taste, in the midst of a charming and affectionate family, and a large circle of sympathizing friends, the evening of his life was largely passed in quiet and undisturbed repose. Occasionally the little world of "Locust Grove" was fluttered by the announcement of the completion of some new telegraphic enterprise, as the fruits of his invention, but it soon subsided into its customary channel, and moved along as quietly and as undisturbed as the dreamy river that flowed languidly at its feet.

His city home was as beautiful as a refined taste and ample fortune could make it. He leaves his family amply provided as to means, and the richer legacy of his own memory.

PROF. MORSE'S FUNERAL.

The funeral services in honor of Prof. Morse were held Friday, April 5th, at Madison Square Presbyterian Church, New York, preceded by a prayer at the house in West Twenty-second street, where only the relatives and intimate friends were in attendance. All the available space in the Church, excepting reserved pews along the center aisle, was crowded an hour before the time appointed for the services. The communion table was covered with the choicest flowers arranged as crosses, crowns, and wreaths, one beautiful cross of rare, white blossoms, being a tribute from the young ladies of Rutgers College.

The body was inclosed in a plain casket, covered with a black cloth with a narrow beading of silver running around it. It was covered with a pall of black velvet, upon which were, at the head, a crown surmounted by a cross of flowers, while an anchor rested near the centre of the coffin, and a wreath at the foot, while the table in front of the pulpit was covered with floral offerings.

At 11 o'clock the funeral procession entered the Church in the following order during the rendering of an original offertory of dirge music by the organist, Mr. Bassford:

Rev. Wm. Adams, D. D.;

Rev. Francis B. Wheeler, of Poughkeepsie, Pastor of the Church which Professor Morse attended when at Poughkeepsie.

Corpse.

Pall Bearers:

William Orton,	Cyrus W. Field,
Daniel Huntington,	Charles Butler,
Peter Cooper,	John A. Dix,
Cambridge Livingston,	Ezra Cornell.

The family.

Governor Hoffman and Staff.

Members of the Legislature.

Directors of the New York, Newfoundland and London Telegraph Company.

Directors of the Western Union Telegraph Company and officers and operators.

Members of the Academy of Design.

Members of the Evangelical Alliance.

Members of the Chamber of Commerce.

Members of the Association for the Advancement of Science and Art.

Members of the New York Stock Exchange.

Delegations from the Common Councils of New York, Brooklyn, and Poughkeepsie, and many of the Yale Alumni.

The Legislative Committee, comprising Messrs. James W. Husted, L. Bradford Prince, James C. Osgood, Samuel J. Tilden, Severn D. Moulton and John Siimpson.

Among the many distinguished persons present were Gen. Sickles, and ex-Congressman Robinson of Brooklyn, who rendered efficient service to Prof. Morse in his first efforts to secure assistance from Congress for the telegraph, and stood by his side when the first message was sent.

THE BODY

was contained in a casket covered with black cloth, with silver heading and rich silver mountings.

The ball-bearers, who wore white scarfs, with black knots at the shoulders, took their seats in front of the pulpit. The casket was then partly opened, exposing the features of the deceased. Flowers were strewn over it, and in the centre was the following inscription:

SAMUEL F. B. MORSE,
Born April 27, 1791.
Died April 2, 1872.

After the audience was seated the choir sung the anthem,

"I HEARD A VOICE FROM HEAVEN,"

From the Greatorex collection. Dr. Adams read appropriate selections from the Scriptures, and the hymn, "Asleep in Jesus, blessed sleep," was sung by the choir to the tune of "Rest," both words

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and music being favorites of the deceased. The following address was then delivered by Dr. Adams:

ADDRESS.

How poor and paltry the words of man in the presence of the great mystery of death! How weighty, how sublime those words of God with which we are bidden on such occasions to comfort one another: "Being born again, not of corruptible seed, but of incorruptible, by the word of God, which liveth and abideth forever. For all flesh is as grass, and all the glory of man as the flower of grass. The grass withereth and the flower thereof falleth away. But the word of the Lord endureth for ever, and this is the word which by the Gospel is preached unto you." Two aspects here of man. According to the one he is frail and fading as the flowers which love strews over his bier. According to the other he is imperishable and abiding as the Word of God.

The true value of a good life can never be lost to the world. The good which men do lives after them, and cannot be interred with their bodies. Abel, the first one of our race who tasted death, being dead, still speaketh. He is the true Methuselah who originates good thoughts and projects, which live a thousand years after he has passed from the world.

Two days ago a funeral procession filed through our streets with muffled drum, flags draped with black, and every sign of public woe, bearing the remains of one whom we all loved and honored to their last resting-place. As the pageant went by you said to yourself, such is the end—life all over, and like a vaper vanished away. Not so. The fidelity and loyalty of the brave Christian soldier are not lost and cannot pass away, but have entered as permanent properties into the life and history of his country.

Preeminently true is this of the distinguished man, whose death has brought us together at this hour. If it be true, according to the Scripture, that no man dieth to himself, emphatically true is it, that the death of such a man is like the fall of an oak in a grove, creating a wide chasm, and bearing many vines and trees and boughs with it to the ground. Deep as are the sorrows in the home circle, and in private intimacies, occasioned by this event, his death cannot be regarded but as a public bereavement. We sorrow not alone; millions have shared the shock. One is awed by the thought that no sooner had death come to this dear and honored friend, than by means of the instrument which his genius had perfected, the intelligence was sobbed beneath the billows of the western ocean, across the continents eastward and westward, and simultaneously was the topic of remark and the occasion of grief in London, Paris, Rome, Vienna, Berlin, St. Petersburg, Syria, Egypt, India, China, Australia, Japan, and in every part of the civilized world. We say, in familiar phrase, he is dead; but in the best sense he lives still, and will live for ever, in forms of usefulness which are intimately related to the concord, the welfare, and the advancement of the whole human race.

Samuel Finley Breese Morse was the oldest son of the late Rev. Dr. Jedidiah Morse, of Charlestown, Mass., and was born at that place April 27, 1791, and consequently was, abating a few days, eighty-one years of age at the time of his decease.

His youngest brother, Mr. Richard C. Morse, was buried from this church less than four years ago, being seventy-four years old. The brother next in years, Mr. Sydney E. Morse, departed this life in December last, occasioning a shock to their surviving brother, which never passed away but in his own death. So it has occurred in the providence of God, that I have been called to officiate at the interment of all three of these fond and confiding brothers, and have related many incidents of the remarkable family from which they sprung. It is not necessary to repeat these incidents again, though every repetition confirms me in the deliberate opinion, justified by well-known facts, that no one family in these United States has, by direct and indirect influence of father and son, been related to more acts and agencies of great importance and usefulness to the church and the country, than that of Dr. Jedidiah Morse.

While the name of that father has attained great notoriety by reason of his public works, let not the name and influence of his mother be unhonored. Her features are retained on canvas by the hand of her own son. No one can look on the picture of his mother reading by candle-light, even though uninformed that she was the descendant of an illustrious ancestry, without perceiving that she was a woman fitted to train and inspire her sons for high ends in life. As I have seen him look oftentimes on that picture, which his own heart had created, I have invariably recalled the words of Cowper, when gazing upon the picture of his own mother:

"My boast is not that I deduce my birth
From loins enthroned and rulers of the earth,
But higher far my proud pretensions rise,
The son of parents passed into the skies."

Some lives there are which have all the interest and charm of an epic poem, so wonderful are the conjunctions of providential events which enter into their plan and evolution. The most rapid reference to some of the incidents in the life of Prof. Morse, is all that can be expected on this occasion.

Graduating at Yale College in the year 1810, and developing an early fondness for art, he went abroad for the purpose of study. A pupil of Benjamin West, the intimate associate of Allston, Leslie, and Coleridge, of whom he abounded in felicitous reminiscences, he returned to this country, bringing with him the honorable testimonials of his success. Fond of his profession, the founder and President of the Academy of Design in this city, and expecting to devote his life to the art of painting, it was owing to a singular incident associated with the fidelity of his father in the advocacy of evangelical truth in Massachusetts, that he was diverted from the pencil and the brush to those studies and experiments which resulted in the inventions which have given him his world wide renown.

I have no intention, at this time and place, to give the detailed history of his connection with the magnetic telegraph. As those various associations of science and art with which he was connected, will vie with each other in vindicating the truth of this matter, I shall intrust that eulogy to them, passing myself to those moral and religious aspects of his life and work, which seem to me the most appropriate to be uttered by a Christian minister in the sanctuary where he was so long accustomed to worship.

This I am sure is the method which most accords with the modesty of our deceased friend; for, while the world was filled with the splendor of his success, such was the genuine quality of his religious faith, that first and last, he delighted to regard himself as the child and agent of Providence. That first message which was flashed through the first public telegraph wire, put into words by a privileged friend at his side, "What has God wrought!" was no affectation, but the sincere expression of one who always devoutly felt his dependence on Divine Providence throughout the whole success.

The period of time, in the history of the world, when telegraphic communication was established, is not the least of the many providential aspects which command our notice. The early and long segregation of nations, prior to the Christian era, was no accident. So long as Christianity was not ready for the world, the world was not ready for Christianity. The isolation of one nation from all others, to be the depositary of Divine revelation, seems to have been a necessary part of the Divine plan. As Christianity grew ripe and ready for replanting, propogation and reproduction, corresponding changes in the relations of different nations became apparent; as those changes went on in the revolutions and reformations of successive generations, it became evident, especially in that resuscitation of spiritual and reformed Christianity, which, during the early part of this century, passed like the breath of Spring over Protestant Christendom, signs were everywhere visible of an intention on the part of Providence to break down international barriers, and by a general inter-communication and fusion of all peoples, to introduce an era of universal interdependence, fraternity and unity.

In this, and not in an earlier period, when it would have been unavailing for good, was the magnetic telegraph brought into use. As the inventor of the instrument which bears his name, Professor Morse, honest and true, never detracted from the merits of discoverers and inventors who preceded him in time; but, from beginning to end, was the foremost to do them honor. Many have supposed that an inventor must be like an insulated jar, hermetically sealed, with no connection with other minds. Whereas, he is rightfully permitted to avail himself of all which he can gather from all sources, books and men; even as a wise master-builder coming upon the ground, where blocks of marble lie in confusion all around him, puts each and all in their proper places, and the whole building rises in order and symmetry to completion.

The highest forms of heroism are those with which good men devote themselves through faith, with patient unintermitted toil and self-sacrifice, to the accomplishment of those objects which look only to the welfare of the race. Milton in his day, mourned over the fact that the world was so intent on admiring its military destroyers, that it had no time to honor those, its benefactors, who were engaged unapplauded in laying the foundations of human improvement. Seldom does it occur that great inventors, sons of science, are permitted to see and enjoy the full results of their success. Generally it has been with them, as with the old Hebrew prophets, of whom we read, that "not unto themselves, but unto us did they minister;" "not having received the promises, but having seen them afar off and were persuaded of them." Like others of his class, Professor Morse, at the beginning of his experiments, was no stranger to trial and opposition. Those who saw him in that upper turreted room of the University, where, like the "Tuscan artist on the top of Fesole," he gave himself to midnight thought and study, will never forget the patience of his faith and hope amid manifest discouragements. To him was alloted, as if he were one of the few noble to whom it was safe that it should be so alloted, the rare privilege of seeing the complete success, and enjoying the full honor and reward of his great invention. He struggled with difficulties and delays, with privations, with ridicule in high places, but he lived to be crowned with more honors and insignia from the different governments and crowned heads of the world, than ever were alloted to any private citizen of our republic. Well has it been said, distinguished merit sooner or later, rises superior to opposition, and draws lustre from reproach; as the clouds, which in the morning veil the sun and darken its early career, arrange themselves at the hour of its setting, into a brilliant and magnificent array, taking and reflecting glory from its descending rays.

Very seldom, in the history of men, is there to be seen a life so complete as his in all its parts. "Them that honor me I will honor," says the God of the Scriptures. "Length of days, peace, riches and honor," are the promised gifts of divine Wisdom. Promises how well fulfilled in the case of this honored friend. He saw all the nations of the world knitted together by nerves and cords of immediate intercommunion. Remembering as I do his earliest experiments, and the modest confidence of his words at the first public exhibition of his invention, "I see not any limit to its power, and why it may not act around the world," what a pleasure it was to me to report to him on my return from successive visits abroad, the daily use I had made of his telegraph, among the mountains and valleys of Switzerland, and invariably did his response include a most grateful and admiring reference to the agency of Divine Providence.

A few days before his decease, in the privacy of his chamber, I spoke to him of the great goodness of God to him in his remarkable life. "Yes, so good!" was his quick response, "and the best part of all is yet to come." Spared to see more than eighty years, he saw none of the infirmities of age either in mind or body. His delicate taste, his love for the beautiful, his fondness for the fine arts, his sound judgment, his intellectual activity, his public spirit, his intense interest in all which concerned the welfare and decoration of the city, his earnest advocacy of Christian liberty throughout the world—continued unimpaired to the last. With perfect health, in full possession of every faculty, urbane and courteous, there was no infelicity of temper or manner, such as sometimes befalls extreme age. Surrounded by a young family, he was their genial companion and friend, sympathising in all those pleasures and innocent things which give a charm to home.

The greatness which consorted with sages was associated with that simplicity, which, as by affinity of tastes, attracted little children to his arms. In particular qualities he had many equals and superiors, but in that rare combination of excellences which, like the harmony of colors in a finished picture, made him what he was, he

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was unrivalled. So that for these many years he has seemed to me, and this is the image of him in his life and death which I shall always retain, a personification of manly beauty, haloed with the glory which God gives to the hoary head, found in the way of righteousnes.

So I come to speak more distinctly of our friend as a disciple of Jesus Christ. In speaking of him as a Christian I would wish to avoid all vague and indefinite language. Much more would I deprecate mere technical words. Peculiar opportunities have I enjoyed for forming a judgment of his Christian character. Religion with him was something more than a thin varnish over his own pictures, designed to bring out their light and shade. It was wrought into the very substance of his soul and life. His convictions of truth were very discriminating. He was not only fond of, but a proficient in theological literature. As a worshiper and devout listener in the house of God, he evinced that magnetic sympathy with the preacher which every pastor feels, though he cannot describe. Especially did he kindle into enthusiasm at all words which aimed to honor and glorify his divine Lord. Distinct impressions have I of particular occasions when he gave utterance, with special emphasis, to his religious emotions. Last autumn he was occupied officially, with many of our fellow-citizens, in acts of attention to the representative of the royal house of Russia. At the holy communion in this church next ensuing, an occasion in which, for domestic reasons, he felt an extraordinary interest—at the close of the service he approached me with a more than usual warmth and pressure of the hand, and, with a beaming countenance, said: "This is something better and greater than standing before princes."

His piety had the simplicity of childhood. Will his household ever forget the heartiness and reverence of their family worship? The word of God, was it not his daily meat and drink? Will those who have so many years seen him in this house of God, ever part with the image of his earnest devotion?

While others speak of the brilliancy of his public honors, the success of his life in the judgment of the world bordering even on the creations of romance, these are the things which are to be magnified above all else. He was a sincere believer, a true, modest, humble, happy disciple of Jesus Christ. So was he for many years, even from his youth. His departure corresponded to his life. No perturbations of body or mind; all was calm, dignified, and beautiful. Industrious in his library, writing every day, in that clear, perfect penmanship for which he was remarkable, up to those last few days of seclusion in his chamber, where life was to end, everything was in keeping with his habitual serenity and sweetness. When sleeping away into apparent unconsciousness, he would always respond with animation to the mention of the name and promises of our Saviour. When it was surmised by some that he had passed beyond all power of intelligent communication, I repeated those great words of apostolical confidence, "I know whom I have believed;" he instantly replied, "I know him, too—certainly I do—it is all right." Believing, as I do, that the sick and dying are oftentimes disturbed by officious words and inquisitiveness, and content if able to hold up to the rayless eye some simple object from the Scriptures, I began the recitation of some short sentence, when he would take it from my lips, and complete the quotation.

Last Sabbath noon he had lost the power of articulation, and, as friends supposed, his consciousness also. Waiting at his side for the intelligent opening of his eye, I repeated to him the text from which I had just preached an Easter sermon, "Thanks be to God who giveth us the victory, through our Lord Jesus Christ." Instantly he nodded assent, and, with a speaking pressure of my hand, gave me to understand that through faith in his Redeemer he was a conqueror, and more than a conqueror. What are all victories ever won upon the earth compared with that calm and fearless conquest over death and the grave which is given to those who believe in Jesus?

The agencies by which the coming of the kingdom of God among men is to be accelerated are many and various. The telegraph was from its inception consecrated by prayer. I speak that which I do know, when testifying that when the project was formed and accomplished of laying the electric wires beneath the sea, more than one of its projectors not only implored devoutly divine aid, but in God's name dedicated it to the great cause of human brotherhood and kindness. I am told by one who can speak advisedly on this subject, that among all the messages which have been sent from nation to nation concerning all things great and small, diplomacy, commerce, marriages, births, deaths, it is not known that one unkind, one angry, one profane word has ever passed. One of the last, if not the very last public communication from Professor Morse, was a letter written to the International Telegraphic Convention recently held in the city of Rome, in which in view of the possible contingency of wars, occurs the following sentence: "In the interest of human happiness, of that peace on earth which announcing the advent of the Saviour, the angels proclaimed with good will to men, I hope the Convention will not adjourn without adopting a resolution asking of the nations their united effective protection to this great agent of civilization."

Over the bier of the good man by whose hand that sentence was penned let us all pledge ourselves to devote life and faculty to the promotion of that kingdom which is righteousness, and peace, and joy in the Holy Ghost.

How direct the agency of that instrument which is now in our thoughts, may be on the kingdom of Christ upon the earth, we may not say. It is possible that in those great events which are to be unfolded in the future, a more literal sense may be given to those words of our Lord, than has entered into our minds: "As the lightning cometh out of the East and shineth even unto the West, so shall also the coming of the Son of man be." So it may occur in those halcyon days which inspired prophecy has taught us to anticipate, when wars and rumors of wars shall cease, and violence shall no more be heard, and the promised king of all the earth shall come down like rain upon the mown grass, and as showers that water the earth, in whose days the righteous shall flourish and abundance of peace so long as the moon endureth—that from the uttermost parts of the sea the word shall be given forth, "the Lord is here:" and from worshiping millions at the opposite pole, bathed and blessed in the love of Christ, the response shall come back, "the Lord is here:" for the earth shall be full of the knowledge of the Lord as the waters cover the sea. He makes the most of life who of set purpose devotes himself and all which God has given him to the promotion of that great end.

To-day we part for ever with all that is mortal of that man who has done so much in the cause of Christian civilzation. Less than one year ago his fellow-citizens, chiefly telegraphic operators, who loved him as children love a father, raised his statue of bronze in our Central Park. To-day all we can give him is a grave.

Farewell, beloved friend, honored citizen, public benefactor, good and faithful servant. While thy eulogy shall be pronounced in many languages by thy fellow men, this I believe, was your own highest aspiration—to have your name as a humble disciple written in the Lamb's Book of Life. There it will shine, and ours also, even the humblest of us all, if united to Christ, above the brightness of the firmament and as the stars for ever and ever. A small thing is it to be judged of man's judgment; and all the greatness and glory of this world passes away like a dream. "God excepteth not the persons of princes, nor regardeth the rich more than the poor; for they all are the work of his hands." Truly great and immortal is that man, however obscure his earthly lot, who so believes in Jesus Christ that he may appopriate to himself the words of the Lord of Life, "because I live ye shall live also."

The three grandest objects which ever can occupy the mind of man are the Redeemer, the human soul, the day of death and judgment. Blessed is that man and so will he be when all the thrones, monuments and eulogies of the world are forgotten—who so lives that he shall be able to combine the three and say, as did this true christian in his last articulation, "I know whom I have believed—and am persuaded that he is able to keep that which I have committed to him against that day."

Prayer followed by the Rev. Dr. Wheeler, and the chant "Just as I am without one plea," was rendered by the choir. An opportunity was then given to take a last look at the venerable face of the distinguished professor, and while the organist played a funeral march of Chopin, the immense audience slowly moved up the centre aisle past the coffin, and dispersed. The congregation manifested the greatest respect and reverence for Prof. Morse, but there were few indications of mourning, the prevailing feeling seeming to be that a noble life, crowned with the greatest of earthly successes and honors, had reached a fitting and worthy end.

At the conclusion of the services at the Church, the remains were taken to Greenwood Cemetry and deposited in the receiving vault. The burial service was read and prayer offered by the Rev. J. A. Hodge of Hartford, son-in-law of the late Richard Morse, and the benediction was pronounced by the Rev. Dr. Wheeler.

The following letter, which is entirely in Prof. Morse's handwriting, will show that old age did not impair the vigor of his faculties. The chirography is wonderful for its clearness, and would do credit to any young man. Below is the letter, which speaks for itself:

We may add that when this letter was read at the convention in Rome, prolonged cheers were given for its author, and the letter itself was ordered to be printed among the records of the convention.

NEW YORK, Dec. 4, 1871.

MY DEAR MR. FIELD: Excuse my delay in writing you. The excitement occasioned by the visit of the Grand Duke Alexis has just closed, and I have been wholly engaged by the various duties connected with his presence.

I have wished for a few calm moments to put on paper some thoughts respecting the doings of the Great Telegraphic Convention, to which you are a delegate.

The telegraph has now assumed such a marvelous position in human affairs throughout the world; its influences are so great and important in all the varied concerns of nations, that its efficient protection from injury has become a necessity. It is a powerful advocate for universal peace. Not that of itself it can command a "Peace, be still!" to the angry waves of human passions, but that by its rapid interchange of thought and opinion it gives the opportunity of explanations to acts and laws which in their ordinary wording often create doubt and suspicion.

Were there no means of quick explanation it is readily seen that doubt and suspicion working on the susceptibilities of the public mind would engender misconception, hatred and strife. How important then that in the intercourse of nations there should be the ready means at hand for prompt correction and explanation.

Could there not be passed in the great International Convention, some resolution to the effect that in whatever condition, whether of peace or war between nations, the telegraph should be deemed a sacred thing, to be by common consent effectually protected both on land and beneath the waters?

In the interest of human happiness, of that "Peace on earth" which, in announcing the advent of the Saviour, the angels proclaimed with "good will to men," I hope that the Convention will not adjourn without adopting a resolution asking of the nations their united effective protection to this great agent of civilization.

The mode and the terms of such resolution may be safely left to the intelligent members of the honorable and distinguished Convention. Believe me as ever, your friend and servant,

SAMUEL F. B. MORSE.

Hon. Cyrus W. Field, Rome, Italy.

Thus with vigor of mind unimpaired, with steady hand and undimmed eye, with peace in his heart and "Peace on Earth" on his lips, Professor Morse ended his earthly mission.

OFFICIAL.

NEW YORK, April 4, 1872.

To all telegraph Superintendents and Managers in the United States and Canada. All that is mortal of the venerable, and venerated father of the American telegraphic system, Prof. Samuel F. B. Morse, will be consigned to the grave on Friday, April 5th. No expression or outward exhibition can give fitting evidence of the sorrow which his death has occasioned among those connected with the telegraph, or within the reach of its influence, not only in America, but throughout the world, but in token of respect to his memory, some symbol of mourning should be exhibited at all telegraph stations on the day of burial, a simple rosette, or a bit of crape will suffice.

WILLIAM ORTON, Pres't.

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TRIBUTES TO HIS MEMORY.

THE DEAD JUPITER.

[Professor S. F. B. Morse. Obiit April 2, 1872.]

BY A. B. WATSON.

To-day a God died.—*Thomas Baily Aldrich.*

Draw near and see our Jupiter, who, dead,
Upon this stretcher is a-lying here!—
"What! a god dead!—I'd see dead Jupiter!"
Come see! Aye, this must be a god's—this head;
The cheek has lost its last faint blush of red;
There are no bolts in those dead hands to fear!
The weasels are purposeless. You can stand anear!
He's wrathless now for lo, our Jove is dead!
"But was he Jove? On what point have ye hung
So fair opinion of him?" Did not these hands
Weave the enchanted lightning into brands,
Tongue-burthened and obedient, that have strung
A zone of speech around the world, to prove
The fame of him who's dead there? He is Jove.

ACTION OF CONGRESS.

In the House of Representatives Mr. Cox, of New York city, offered a concurrent resolution, which was agreed to, declaring that Congress has heard with profound regret of the death of Professor Morse, whose distinguished and varied abilities have contributed more than those of any other person to the development and progress of the practical arts, and that his purity of private life, his loftiness of scientific aims and his resolute faith in truth render it highly proper that the Representatives and Senators should solemnly testify to his worth and greatness.

Mr. Wood, of New York city, gave a brief history of the legislation under which Professor Morse's invention was practically tested in the United States. He (Mr. Wood) was a member of the Twenty-seventh Congress, to which Professor Morse made application for aid to test his invention. It was in the winter of 1842 and 1843 when Mr. Morse came to Washington in a state of pecuniary dependence, broken down by disappointment and almost entirely discouraged. With great difficulty the proposition appropriating $30,000 was got through the House by a vote of 89 to 87. It was with great pride that he (Mr. Wood) found his name recorded in the affirmative, and he was to-day the only living member of either house who voted in favor of the bill. With that small appropriation the first wires were stretched between Baltimore and Washington, which tested and proved the entire practicability of the invention which Professor Morse had struggled so long to make a practical success.

THE NEW YORK LEGISLATURE.

ALBANY, April 3, 1872.

Resolutions relative to the testimonial of Professor Morse, and ordering that a committee be appointed to attend his funeral were adopted. It was also suggested that his statue be placed in the Capitol at Washington in place of, or in addition to, the statue of Robert Fulton.

GOVERNOR HOFFMAN'S COMMUNICATION.

ALBANY, April 3. 1872.

The Governor sent in by his private secretary the following communication:

STATE OF NEW YORK, EXECUTIVE CHAMBER,
Albany, April 3, 1872.

To the Legislature:

The telegraph to-day announces the death of its inventor, Samuel F. B. Morse. Born in Massachusetts, his home has for many years of his eventful life been New York. His fame belongs to neither, but to the country and to the world; yet it seems fitting that this great State, in which he lived and died, should be the first to pay appropriate honors to his memory. Living, he received from governments everywhere more public honors than were ever paid to any American private citizen; dead, let all the people pay homage to his name.

I respectfully recommend to the Legislature the adoption of such resolutions as may be suitable and the appointment of a joint committee to attend the funeral of the illustrious deceased.

JOHN T. HOFFMAN.

HONORS TO MR. MORSE.

Resolutions of the State Senate in honor of the late Inventor.

Special dispatch to the New-York Times.

ALBANY, April 6.—The Senate Committee to draw up resolutions relative to the death of Prof. S. F. B. Morse, on Saturday reported the following:

The undersigned Committee, appointed to draft appropriate resolutions for the memory of Prof. S. F. B. Morse, beg leave to report the following:

Resolved, That the Senate have heard with profound regret of the death of Samuel F. B. Morse, whose achievement of science in rendering the electric telegraph of practical usefulness, has constituted him one of the greatest benefactors of the human race, and that they recognize this official expression as eminently due to his memory.

Resolved, That we remember with pride, that, while a citizen of this State, his thought conceived and skill formed the art which has marked a new era in the progress of civilization.

Resolved, That the career of Prof. Morse through all the discouragements which beset him, is the pride of this his adopted State, and that these resolutions be entered upon the Journal of the Senate, and that a copy thereof, duly certified, be transmitted to the family of the deceased.

Committee.—WM. B. WOODIN,
H. C. MURPHY,
D. P. WOOD.

The resolutions were unanimously adopted.

MEETING IN WASHINGTON—ARRANGEMENTS FOR A NATIONAL MEMORIAL CELEBRATION AT THE CAPITOL.

WASHINGTON, April 4, 1872.

A large meeting of citizens of Washington was held here this evening to take action in relation to the death of the late Professor Samuel F. B. Morse, Professor Hedrick acting as Chairman and H. Amidon as Secretary. Arrangements were made to obtain the use of the hall of the House of Representatives for imposing memorial services in honor of the late Professor, to take place, probably, on Monday evening, April 15, at which distinguished gentlemen will deliver addresses. The Secretary of the Navy has offered the Marine Band for the occasion, and the Washington Choral Society, which won a prize at the recent musical festival in New York, have volunteered their services.

Mr. A. S. Solomans offered the following resolution, which was unanimously adopted:

Resolved, That the people of the United States be requested to meet in their respective cities, towns, and villages on the evening of the —— day of April, at eight o'clock, to give expression to the loss sustained by the world in the death of Professor Samuel Finley Breese Morse, and to hold simultaneous communication by telegraph with the assembly of the people's representatives and the citizens of Washington, convened for the like purpose in the capital of the nation.

To this the Western Union Telegraph Company sent a prompt response:

A. S. SOLOMANS, ESQ.:

MY DEAR SIR:—I am authorized by Mr. Orton, our President, to say to you that the Company will cheerfully grant the use of our wires, for direct communication between the simultaneous Morse memorial meetings, which it is proposed to hold. Please advise me of the date fixed upon for the meeting.

Very truly, yours,
LEONARD WHITNEY, Manager.

A committee of five on resolutions, with Senator Patterson as chairman, and a committee of arrangements of fifteen, with Mr. A. S. Solomans as chairman, were appointed, with full power to act, and the meeting adjourned.

The following resolution was passed by the National Telegraph Morse Memorial Association.

WHEREAS, The United States House of Representatives has placed the Hall at the disposal of this Association for the purpose of holding a memorial meeting in honor of the late Samuel F. B. Morse, on Tuesday, April 16, and prominent members of both houses of Congress have consented to address the meeting; and,

WHEREAS, Telegraph wires have been freely placed at the disposal of this association for that evening; therefore,

Resolved, That the municipal authorities of the cities and towns of the United States are hereby invited to hold meetings of a similar character in their several localities on the same evening, in order that the meetings may be in telegraphic communication, and thus a simultaneous expression be given to the national grief on the occasion of this irreparable loss.

MASSACHUSETTS.

Resolved, That the Legislature of Massachusetts has learned, with profound regret, of the decease of Samuel Finley Breese Morse, the distinguished inventor of that wonderful system of electric telegraphy which is conferring unspeakable blessings upon the whole human family.

Resolved, That, born upon our soil, and under the very shadow of this capitol, his name will ever be associated by the people of this state with that of another of her illustrious sons, who demonstrated to the world the existence of that mighty but subtle agency, which the genius and skill of his peer and successor has brought under subjection and made subservient to the will of man.

Resolved, That with the regrets his death has occasioned are mingled emotions of joy and gratitude that he was permitted by Him in whose hands are the issues of life and death, to attain to the full age allotted to man upon the earth, and that he was thereby enabled to witness the complete triumph of the work to which his life was consecrated—a privilege which has seldom been enjoyed by the world's greatest benefactors.

Resolved, That his excellency the governor be requested to transmit a copy of these resolutions to the family of the deceased, with the assurance of the sympathy of the people of this commonwealth in the loss they have sustained.

THE WESTERN UNION TELEGRAPH COMPANY.

NEW YORK, April 3, 1872.

A meeting of the Board of Directors of the Western Union Telegraph Company, was held at the office of the Company, 145 Broadway, to-day, to take action relative to the death of Professor Morse. A committee consisting of Ezra Cornell, Hiram Sibley, Sir Hugh Allan, Cambridge Livingston, Dr. Norvin Green, Edward S. Sanford and Willam Orton were appointed to prepare suitable resolutions expressive of the feelings of the Company at the decease of Professor Morse. The following resolutions were adopted:

WHEREAS, the Board of Directors of the Western Union Telegraph Company, have learned of the death of Professor Samuel F. B. Morse, the father of the American telegraph system, whose name has become justly identified with the establishment of the telegraph throughout the world, therefore,

Resolved, That we mourn with the entire civilized world, the loss of one of the great benefactors of the age, and we grieve for a friend and associate whose purity and simplicity of character and kind and gentle nature have endeared him to our memories. While his great achievement will continue to bless and benefit the enlightened races of mankind, the memory of his personal worth will ever remain in the hearts of all who have had the good fortune to know him.

Resolved, That we unite in the universal expression of sorrow which is this day being transmitted to and echoed back from all quarters of the earth by means of his transcendant achievement; and we hereby tender our earnest sympathy to the family of our friend.

Resolved, That this Board will attend Professor Morse's funeral in a body.

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THE NEW YORK, NEWFOUNDLAND AND LONDON TELEGRAPH COMPANY.

At a meeting of the Directors of the New York, Newfoundland and London Telegraph Company, held at the City Bank, on the 3d day of April, 1872, it was unanimously

Resolved, That the Directors of this Company have heard with deep regret of the decease of Professor Samuel F. B. Morse, who died last evening at his residence in this city,

Resolved, That we grieve for the death of Professor Morse, not only because he was a distinguished philosopher and the founder of the telegraph system, which has so changed the relations, commercial and social, of the world, but because he was our intimate associate and friend, having been connected with this Company for the last eighteen years, and that we tender to the family of the deceased our sympathies in the hour of their affliction.

Resolved, That the Directors of the company will, in a body, attend his funeral, and that a copy of these resolutions be transmitted to his family and entered on the minutes of this Board.

EDWIN F. HATFIELD, Jr., Secretary.

THE BROOKLYN POLICE.

Chief of Police P. Campbell caused the following order to be sent to the captains of precincts of Brooklyn yesterday morning:

You will cause the flag on your station to be displayed at half-mast until further orders, out of respect to the memory of Professor Morse, the Father of Telegraphy.

CHAMBER OF COMMERCE.

Mr. George W. Dow, at the Chamber of Commerce, offered the following resolutions, which were unanimously passed.

Resolved, That the members of this Chamber have learned with sorrow and regret of the death of Professor Samuel F. B. Morse, a gentleman whose name has become cosmopolitan, and whose great scientific invention—"wrought by God," as he gratefully acknowledged—has electrified the whole world by giving to our globe a nervous system of far-reaching and quick intelligence which has astonished mankind by its marvelous activity and power in the dissemination of ideas and the advancement of commerce and civilization. As an American citizen and inventor of eminence, we will cherish and respect his memory. His fame belongs to all nations, and will shine forth illustriously in the galaxy of man's great benefactors. As representatives of mercantile interest, which have so largely reaped the benefits of his skill and perseverence we acknowledge our indebtedness to him, and we hereby respectfully tender to his widow and family our sincere sympathies at this time of their bereavement.

Resolved, That the foregoing be entered on the minutes of this day's proceeding, and that a copy of the same be suitably engrossed and forwarded to Mrs. Morse.

It was afterward resolved by the Chamber to attend the funeral in a body, and all members are requested to assemble at the church at 10 o'clock this morning.

BROOKLYN COMMON COUNCIL.

A special meeting of the Brooklyn Common Council was held last evening to give expression to their feelings on the death of Prof. Samuel F. B. Morse. The following preamble and resolutions were adopted:

WHEREAS, It has pleased an all-wise Providence to take from among us, in the calm serenity of a ripe old age, one of the world's benefactors, Samuel Finley Breese Morse, the inventor of the American telegraph system; and

WHEREAS, The electric telegraph, in its almost miraculous results, annihilating, as it does, time and distance, spanning oceans, climbing mountains, and, with the exception of one short gap, girding to-day the entire globe, ranks with those miraculous inventions, the printing press and steam engine, the benefits of which are shared by the whole human race; therefore

Resolved, That we, the Common Council of the City of Brooklyn, mourn, with the rest of the civilized world, the loss of Prof. Morse, whose kind and gentle nature and pure and christian life, no less than his great genius, must ever endear him to our memories.

Resolved, That we tender to the family of Prof. Morse our earnest sympathy in the loss they have sustained, and that this Board will attend his funeral in a body.

Resolved, That as a further expression of our respect and sorrow, flags be displayed at half mast on the City Hall to-morrow, April 5th, the day of his funeral.

Resolved, That a copy of these resolutions suitably engrossed and framed, be prepared and transmitted to the family of the deceased.

TROY COMMON COUNCIL.

TROY, April 4,—At a meeting of the Common Council, this evening, the following message from the Mayor was read, and the resolution adopted:

To the Honorable the Common Council:

Samuel F. B. Morse was one of the master men of the world, and a benefactor of the race. His death, like that of a Franklin or a Washington, calls for a universal expression of regret. Respectfully,

THOMAS B. CARROLL, Mayor.

Alderman Wilkinson, in response to the Mayor's cummunication, offered the following resolution.

The City of Troy in Common Council convened, have heard with deep sorrow of the death of Samuel F. B. Morse, the great electrician, and would put on record this utterance as a testimonial of regard for his services and respect to his memory.

The resolution was unanimously adopted.

NEW YORK STOCK EXCHANGE.

A meeting was held at the Stock Exchange, yesterday, and a series of resolutions was passed, expressive of the public loss sustained in the death of Professor Morse. Mr. S. V. White, a member of the Board, delivered an address eulogistic of the deceased. A copy of the resolutions will be presented to the family. As a mark of respect, the two regular calls of Stock will be omitted at the Exchange.

The following resolutions were passed at a meeting of the Board of Directors of the Empire Mutual Life Insurance Company:

Resolved That we have learned with great sorrow of of the death of our associate, Prof. Samuel F. B. Morse; that while we mourn with the whole world the departure of one whose name is indissolubly connected with one of the greatest improvements of the age, we grieve still more at the loss of an intimate friend, whose culture, gentleness and broad sympathies won the profoundest regard of all who were favored with his companionship.

Resolved. That we tender to the family of the deceased, our deepest sympathy in their great affliction, and that the President and Secretary be requested to furnish them with a copy of these resolutions.

NATIONAL ACADEMY OF DESIGN.

Appended are the resolutions passed by the National Academy of Design.

Resolved. That, in common with the rest of the world, it becomes our painful duty to recognize the passing away from among us of Prof. Samuel F. B. Morse, our first President—we may almost say the very founder of our institution—a man endeared to many of us by still closer personal ties, the last of a trio of painters from whom have preceded during the past century the three perhaps most remarkable inventions of the age, in their widespread and still spreading influence upon mankind, for Fulton, Daguerre and Morse are names which will hereafter associate themselves in the minds of men to a very remote stretch of time. He would be bold indeed who should venture to predict the enormous result that may yet grow out of these seeds even beyond their present development, or attempt to unvail all the possibilities of growth that yet he hid in the womb of time. We cannot but feel some pride in the share which study of our common profession must have had in developing those faculties with which he wrought the great telegraphic plan that makes his name forever famous. And though he has secured such a lasting name by other than the pursuit of that art with which he set out in life, had he confined himself thereto, there is little doubt among the best judges in art matters but that he would even there have left his among the roll of names that were not born to die. We desire to mingle our sorrows with those who were nearest and dearest to him in sympathy and condolence with their grief, and may he rest in peace.

Resolved, That we will attend the funeral of our deceased brother academician, and that these minutes be entered on the minutes, and a copy of them be transmitted to the family.

THE NASHVILLE OPERATORS.

At a meeting of the operators and other telegraphic employes of Nashville, held at the office of the Western Union Telegraph Company, at 3 P. M., April 4, for the purpose of taking appropriate action on the sad occasion of the death of Professor Morse, the meeting was organized by the election of Mr. Jo. W. Fisher, as Chairman, and Mr. E. C. Boyle, Secretary.

Messrs. Geo. W. Trabue, W. P. Gentry, and J. B. Morris, were appointed a committee to draft appropriate resolutions expressive of the meeting, and the following was reported by Mr. Trabue, Chairman of the Committee, and unanimously adopted:

WHEREAS, The melancholy tidings of the death of Professor S. F. B. Morse, at 7:43 P. M., April 2, has reached us, therefore,

Resolved, 1. That having long entertained for Professor Morse a filial regard inspired by habitual feelings of reverence towards him, as the illustrious Father of the Telegraph, and respect for his character and genius, we receive the intelligence of his death with the deepest sorrow and regret for this our own, and our countries loss.

Resolved, 2. That in the death of Professor Morse, the people of the whole world have lost one whose name does and will continue as long as time lasts, to illuminate and mark the century in which he lived as the brightest and best of all preceding centuries, and an age in which more has been accomplished for science, than any other, and one in which more great discoveries have been made, in the way of developing the materials and elements which God intended for the use and benefit of man, but which remained undiscovered and useless so many ages, for the want of determined and resolute men like Professor Morse.

Resolved, 3. That while it is the common duty of all his countrymen to honor his memory, it shall ever be our pride to cherish a more tender regard, and to emulate his many virtues as well as his immortal achievements in the art of telegraphy.

GEO. W. TRABUE, Chairman,
W. P. GENTRY,
JNO. B. MORRIS.

Pending the adoption of the resolutions, Messrs. Trabue and Gentry made very appropriate and interesting remarks, eulogizing the illustrious deceased, and urging the younger members of the profession to profit by his example of patience and perseverance, under the adversities attending the initiation of his wonderful invention, which, finally led to complete success, and crowned him with honors, seldom conferred upon man.

LOUISVILLE, KY.

LOUISVILLE, April 3d, 1872.

At a meeting of the Telegraph Operators of this city, the following resolutions were adopted:

WHEREAS, It has pleased the Divine Providence to call from our midst our dearly beloved and respected friend and benefactor, Professor S. F. B. Morse, the Father of Telegraph.

Resolved, That in this bereavement, the world has lost a scientific benefactor, a kind and noble man, an ornament not only to science, but to public and private life in all its phases, a loss which cannot be replaced.

Resolved, That we, the Telegraph Operators of this city drape our instruments in mourning, for a period of thirty days, and wear the usual badge of mourning for one week as a token of esteem for the departed.

Resolved, That we hereby tender our sympathies to the bereaved family in their deep affliction, and earnestly pray that God will alleviate their grief, and afford that consolation to their stricken hearts which God alone can give. Signed,

N. DEBREE, W. U. Telegraph,
CHAS. SMITH, "
L. SHELDON, S. P. & A. Telegraph,
AUGUSTUS MEADE, "
Committee.

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JEFFERSONVILLE, Ind., April 4th, 1872.

At a meeting of telegraph operators connected with the J., M. and I. R. R. Co., held this day, the following resolutions were adopted:

WHEREAS, It has pleased Divine Providence to remove from our midst our friend and benefactor, Prof. Samuel F. B. Morse, the inventor and father of the telegraph—

Resolved, That in the death of this venerable man, through whose instrumentality all nations of the globe have been brought into one neighborhood, and whose matchless inventions have furnished honorable employment for our numerous fraternity, we, as individuals, thereby lose a dear and cherished friend, the world a philosopher, and our fraternity a father.

Resolved, That, as a token of our respect and esteem for the honored dead, we drape our instruments and wear the usual badge of mourning for thirty days.

Resolved, That we hereby tender our sympathies to the family and relatives of the deceased, earnestly praying that they may secure that true consolation in their great affliction through Him that doeth all things well.

Resolved, That a copy of these resolutions be forwarded to the JOURNAL OF THE TELEGRAPH, and to the various newspapers printed on the line of this railroad, for publication

Committee, A. L. EGGLESTON,
W. S. CONE,
H. H. PINNEY,
T. J. BAINE,
F. B. GEOGHEGAN.

CINCINNATI.

CINCINNATI, April 5.

The alarm bells of the Fire Department of this city tolled this morning, as a tribute to the memory of Professor Morse, as the funeral cortage is moving in the city of New York.

HUDSON.

HUDSON, N. Y., April 5.

The telegraph offices in this city are deeply draped in mourning to-day, and the flag on the *Register* office is placed at half mast, out of respect to the memory of the late Professor Morse.

HARTFORD.

HARTFORD, Conn., April 5.

Governor Jewell has ordered that the flag on the State House be placed at half mast to-day, out of respect to the memory of Professor Morse. The *Times* office flag is also draped in crape on the same account.

ST. LOUIS.

The main office, on Third and Olive streets, of the Western Union telegraph line, was heavily draped in mourning yesterday, as a token of respect to the memory of Professor Samuel F. B. Morse. The wrappings of woe were festooned from the windows of every story and also stretched across the street. A portrait of Professor Morse was also displayed on the Third street front.

MEETING OF CINCINNATI TELEGRAPHERS.

The death of Prof. Morse has plainly left a more than passing sorrow in the breasts of a majority of our people. Among no order of men was it felt so keenly and commented upon to such an extent, however, as among the telegraphic fraternity. Before news had been disseminated in the suburbs the telegraph offices of the Western Union and Pacific & Atlantic companies, and the telegraph poles, with some of the depot offices, were being draped in mourning.

The Western Union also had a large portrait of Prof. Morse draped, and displayed a Morse telegraph register in front of the buildings.

In the evening a called meeting of the fraternity was held in the basement of the Western Union Telegraph office, on Third street, and was presided over by the following named officers: President, G. T. Williams; Vice-Presidents, L. C. Weir, R. Lewis, W. W. Smith, J. C. Van Dusen, Geo. M. Lane, J. W. Sherwood, J. N. Miller, C. S. Rogers, J. S. Lyle, A. Hayward, Jas. E. Reeves, Geo. Floyd, J. C. Clegg, and J. D. Ellison; Secretary, B. H. Johnson.

The first business transacted was the presentation of a report of a Committee on Resolutions, of which the following is a copy:

WHEREAS, It has been the will of God to remove from us our greatly beloved benefactor and friend, Prof. S. F. B. Morse, the great originator of the telegraph,

Resolved, That we have lost at once a brother and a father, one whom we can not replace; the scientific world a great teacher, society a bright and noble ornament of spotless character, and America the inventor of the age.

Resolved, That as a token of esteem for the great deceased, the telegraphers of this city drape their instruments and wear the usual badge of mourning for the space of thirty days.

Resolved, That we extend our tenderest sympathies to the bereaved family in their great loss, and beseech that they may receive consolation from the Giver of all good and perfect gifts.

Resolved, That a copy of these resolutions be forwarded to the *Telegrapher*, JOURNAL OF THE TELEGRAPH, and the daily papers of this city for publication.

The resolutions were adopted and a motion offered by Mr. F. A. Armstrong, ordering the sending of a message, expressive of the sense of the meeting, to the various offices throughout the country also prevailed.

Dr. Nicholson, a telegraph inventor, was then called upon to address the meeting. The importance of the Professor's invention could not be estimated at the present day, but would appear in all its prominence in the light of centuries to come.

Mr. F. A. Armstrong, Manager of the Western Union Company of this city, was the second speaker. He gave a most interesting description of the services attending the dedication of the Morse statue in Central Park, New York city, several months ago. In the evening, at the Academy of Music, the house could hardly hold the mass that took possession of it, and the best people of New York city, with depudations of the same class from other cities, were present. When the lady arose to send the dispatch of greeting, skipping along the lightning freighted wires to the gulf, to the Pacific coast, to the Canadas, and to all intermediate States, a stillness of curious expectancy settled down upon the house. Then, as the aged Professor took his seat at the table and with firm hand transmitted his signature, the quiet was so intense that the telegraphers scattered through the apartments were enabled to distinguish the letters. As the last one sounded, they gave the signal for an outburst of genuine hearty enthusiasm that shook the building and moved with untold pleasure and gratitude to the heart of the old man.

His statue would stand for ages a monument to himself, and a standing source of congratulation to "his children," as he called the telegraph brotherhood. Prof. Morse had won a permanent niche in the temple of this world's fame, and the speaker fully believed he would be received into the next in the character of one who had lived a useful and Christian life on earth.

Mr. W. W. Smith, of the I. & C. Railroad Co., and an ex-telegrapher of high standing, delivered the concluding address. He indorsed the remarks of the preceding speakers, and said that he had also been in attendance at the unveiling of the statue. He had met him on one occasion since then, and Mr. Morse seemed to feel more real delight in speaking of the unveiling ceremony than in recalling all the honors which had been bestowed upon him by crowned heads. The speaker referred to his first visit to the Professor, and the kindly manner in which he had received him, and closed his address with the remark that, in the face of all his history, no higher eulogy could be bestowed upon him than to simply say, "He is dead. Not a soul regrets that he has lived."

NEW ORLEANS.

The operators of the Pacific and Atlantic Telegraph Company, and those of the Fire and Police offices, met last evening in a body at the City Hall, with Mr. Chas. A. Adams in the Chair, and Mr. T. J. Rodgers, Secretary. After the meeting was called to order, the following resolutions were proposed and unanimously adopted:

Resolved, That we learn with the most profound feeling of regret of the decease of our beloved master in the art telegraphic, Prof. S. F. B. Morse, and that we unite most heartily in the universal expression of sorrow which swells up from all quarters of the civilized world, which, through his genius, has made us as one family.

Resolved, That while deploring the loss of a man so great and good, and while extending to his family our most sincere sympathies, we may congratulate them and ourselves upon the fact that he had lived to see the utmost realization of his hopes, and goes peacefully to his grave, ripe with years, rich with honors, mourned by continents and traduced by none.

Resolved, That his memory is too closely enshrined in our hearts to require any outward semblance of mourning.

Resolved, That our thanks are due to the Western Union Telegraph Directors; also, to Governor Hoffman, of New York, for the prompt and appropriate manner in which they acknowledged the world's loss.

Resolved, That a copy of these resolutions be forwarded to the family of the deceased.

NEW YORK ARTISTS' FUND SOCIETY.

The Artists' Fund Society of New York has adopted the following tribute to the memory of the late Prof. Morse:

The members of the Artists' Fund Society, called to say a last farewell to their reverend friend and benefactor, Prof. S. F. B. Morse, would express their deep sorrow, relieved by a kind of sacred joy, when they remember his pure and faithful character, his successful labors for the arts of our country, his great achievement as an inventor, his Christian example, his happy and completely finished life, and his peaceful, triumphant death. Early devoted to art, he brought to its pursuit a cultivated mind, conscientious study, and sound practice, leaving works of high excellence, and proving that he was only withdrawn from the greatest success as an artist by the absorbing claims of his famed invention.

We are indebted to him for the foundation of the Academy of Design, for his firm championship of its independence, and for an example of a solid, simple, and permanent method of execution in harmony with the works of the great masters of painting. We recall with affection his paternal kindness as a master in art, his never-failing interest in all that pertained to our profession, his wise counsel to our Society, and his generous gift to its fund. We offer our earnest sympathies to his bereaved family, and invoke for them the highest consolations. By order the Board of Control.

JOHN F. KENSETT, President.
ALEXANDER LAWRIE, Secretary.
April 9, 1872.

SINGAPORE, 15th April, 1872.

To Cyrus W. Field, Esq., New York:

The Chamber of Commerce of Singapore, learned with deep regret the great loss that the telegraphic and scientific world have sustained in the death of Professor Morse. READ.

BOMBAY, 15th April, 1872.

To Cyrus W. Field, Esq., New York:

The Bombay Chamber of Commerce heard with great regret of Professor Morse's death, and records its sense of the great loss caused to the scientific world thereby.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

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Executive Rooms, Western Union Tel. Co.,
145 Broadway, New York.

NEW YORK, APRIL 15, 1872.

UNTO THIS LAST.

In the ripeness and mellow sunshine of the end of an honored and protracted life, Professor Morse, the father of the American telegraph system, our own beloved friend and father, has gone to his rest. The telegraph, the child of his own brain, has long since whispered to every home in all the civilized world that the great inventor has passed away. Men as they pass each other on the street say, with the subdued voice of personal sorrow, "Morse is dead." Yet to us he lives. If he is dead it is only to those who did not know him. To those who knew and loved him he lives still in life's brightest and most coronal glory.

It is not the habit of ardent affection to be garrulous in the excitement of such an occasion as this. It would fain gaze on the dead face in silence. The pen, conscious of its weakness, hesitates in its work of endeavoring to reveal that which the heart can alone interpret, in a language sacred to itself, and by tears no eye may ever see. For such reason, we, who have so much enjoyed the sweetness of the presence of this venerable man, now so calm in his last sacred sleep; to whom he often came with his cheerful and gentle ways, as to a son, so confiding of his heart's tenderest thoughts, so free in the expression of his hopes of the life beyond, find difficulty in making the necessary record of his decease. We can only tell what the whole world has known for more than half a month past, that on the evening of Tuesday, April 2, Professor Morse, in the beautiful serenity of christian hope, folded his hands upon his breast, and bade the earth, and generation, and nation he had honored, farewell. We felt the parting very keenly. We shed warm tears over him as the crowd passed the bier over which affection had just uttered an eloquent and loving eulogy. We felt a heavy sigh go out as we left the vault at Greenwood, where the heavy doors swung back hiding forever the form we loved, and we sit down now to make this record with a kind of sadness, that, as we were the first to open a telegraph office in America for the public use of his great invention, so now, we are ending our own career in the record of his decease. His death is, therefore, in some respect, our own. He went out by the everlasting gate, followed by the loving eyes of all the world, into the brightness of a fresh glory, with all his ermine on. We go out by one of earth's many doors, to enter new toils, and amid which to fall some day, quiet and unknown, as when the willow drops her leaf in the cool breath of the autumn night.

Among the many public notices of Prof. Morse's death, two alone have struck us as peculiarly felicitous, one of them evidently the result of a deep knowledge of its subject. We therefore quote the following language from the New York *Evening Post*, which, from our pen, might seem the exaggeration of an ill-regulated affection.

"The name of Morse will always stand in the foremost rank of the great inventors, each of whom has changed the face of society and given a new direction to the growth of civilization by the application to the arts of one great thought; that it will always be read, side by side with those of Gutenburg and Schœffer, or Watt and Fulton. This eminence he fairly earned by one splendid invention. But none who knew the man will be satisfied to let this world-wide and forever-growing monument be the sole record of his greatness.

Had he never thought of the telegraph he would still receive, in death, the highest honors friendship and admiration can offer to distinguished and varied abilities, associated with a noble character. In early life he showed the genius of a truly great artist. In after years he exercised all the powers of a masterly scientific investigator. Throughout his career he was eminent for the loftiness of his aims, for his resolute faith in the strength of truth, for his capacity to endure and to wait, and for his fidelity alike to his convictions and to his friends. His intellectual eminence was limited to no one branch of human effort, but in the judgment of men who knew him best, he had endowments which might have made him, had he not been the chief of inventors, the most powerful of advocates, the boldest and most effective of artists, the most discerning of scientific physicians, or an administrative officer worthy of the highest place and of the best days in American history."

We believe this to be a just estimate of Mr. Morse's greatness, and yet never was greatness veiled beneath so simple and unobtrusive and unasserting a form.

If men are known by the characters of those they attach to them by their own personal magnetism, then Mr. Morse stands on the highest grounds, for his life has connected him with the most illustrious characters of his age. In England, the Earl of Elgin, the Earl of Lincoln, Lord Brougham, the Marquis of Northampton, the chief Lords of the Admiralty, the officers of the Royal Society were all his friends. In Paris, Arago took him cordially by the hand, and, while yet a young man, working at his easel in the gallery of the Louvre, Humboldt was closely attached to him by the amenity of his manners and his intelligent appreciation of art. They frequently met at the house of Baron Gerard, whose soirees were attended by the most eminent artists of the Continent, and a warm friendship sprang up which grew stronger with years. At one of their interviews, Humboldt presented Mr. Morse with an engraving of himself upon which he wrote as follows:

"To Mr. S. F. B. Morse, whose philosophic and useful labors have rendered his name illustrious in two worlds. The homage of the high and affectionate esteem of

ALEXANDER HUMBOLDT."

The King of Denmark saluted him as a friend, and conferred upon him the decoration of the Order of "Danebroge." The Emperor and Empress of Russia received him with distinguished cordiality. Prince Esterhazy of Austria, the Emperor Napoleon and the chief men of the Continent, accorded him the closest personal attention and honor. The Sultan of Turkey decorated him with the diamond badge of *Nishan Iftichar*. Gold medals of scientific merit were awarded him by the Kings of Prussia and Wurtemberg and the Emperor of Austria. In 1856 the Emperor of the French presented him with the Cross of Chevalier of the Legion of Honor; and in 1858 the Queen of Spain conferred the Cross of Knight Commander of the Order of Isabella the Catholic. From the King of Portugal he received the badge of Knighthood of the Order of the Tower and Sword; and from the King of Italy the decoration of Knight of the Order of SS. Maurice and Lazarus. His friends in England were such men as Benjamin West, Fuseli, Northcote, Lamb, Coleridge, Southey, Rogers, and many of its nobility. There was a peculiar ease and gentleness in his manners which fitted him for the highest social spheres, and in his native land he has been a special subject of national regard, which, though without taking marked national expression, was yet very nearly allied to the power of personal affection.

To Dr. Adams' eloquent address we refer for a revelation of Mr. Morse as a christian man. He was his pastor and intimate friend. None knew him better or loved him more. It leaves us nothing to say on that subject.

We have only now again to express our gratitude in having been made the medium of an honor to Professor Morse, which touched his heart and brightened his last year of life. Only one thing marred that honor. Some papers stated that he was present at the inauguration of his own statue, and in Frank Leslie's fine picture of the scene, he is represented on the stand. Not so. His delicate sense of propriety kept him at home all day, until in the evening he appeared on the great occasion on which he bade so many of us a last and affectionate farewell.

As has been said in more than one of the resolutions offered at meetings throughout the country, Mr. Morse's life is an incentive to the young men of America, as an example of lofty aims and patient persistant endurance, and ultimate triumph. Let them imitate him in his gentleness, in his purity of character, in his broad acknowledgement of the labors of other men, in his genial, sunny, hopeful character, in his unfaltering christian faith. Let all of these characterize the staff of his great invention, and thus it may be said of him that "though dead he still speaketh."

So now, honored father and friend of so vast a family, so dear to us all, farewell. We shall trust to meet thee some coming day in the land where death has no sceptre and the cheek no tears.

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THE LATE PROFESSOR MORSE—THE LESSON OF A LIFETIME.

The name of Morse has been so long among the great names of America that it has had a historical significance. And yet, now that we know the great inventor lies dead, we feel as if there was a wide gap in our national life. All the comforts and blessings that an earthly existence can give to the poor breathing body seem to have fallen to Morse. He lived long after the appointed time. His years were crowned with reverence and honor and fortune. He breathed the incense of that fame that so rarely comes to men in their own time. We are told that the sunshine of fame is always followed by the shadows of envy. It was the happy fortune of Morse to live into that calm, reverential, heaven-tinted twilight of old age, when even envy departs, and we feel at peace with our generation and with God.

We can realize how long Morse remained with us when we look over his life and the events with which he was contemporaneous. We speak of Shelley and Byron as we speak of Pope and Swift, as men who belonged to a far distant past. Yet Morse was an older man than Shelley, and but three years younger than Byron. He was a child when the Robespierres reigned; a lad at school before Napoleon won Marengo; a man in the flush and eagerness of life before he lost Waterloo. We are about to celebrate the centennial anniversary of our republic, and had Morse lived four years longer he could have taken part in the rejoicings as one who had lived under all of the Presidents. With his own eyes he has seen the republic grow from four millions to forty millions; from being an obscure, struggling nationality, to be one of the recognized Powers of the globe. In our own country he saw the rise of slavery, its triumph, its struggle and its fall. One after another he has seen America grapple with the social and political problems generated in this age of progress, and solve them and pass triumphantly on towards a splendid destiny. While America has slowly, surely, patiently, grandly moved on to this destiny, to a brightly opening future, full of duties and opportunities, he has seen revolution and change upturning the thrones and traditions of Europe.

Morse was, perhaps, the most illustrious American of his age. When we come to measure true greatness, how readily we pass from the confusing, barren echoes of what we call glory to what we might call usefulness! Looking over the expanse of the ages, we think more earnestly and lovingly of Cadmus, who gave us the alphabet; of Archimedes, who invented the lever; of Euclid, with his demonstrations in geometry; of Galileo, who solved the mysteries of the stars; of Faust, who taught us how to print; of Watt, with his development of steam, than of the resonant orators who inflamed the passions of mankind, and the gallant chieftains who led mankind to war. We decorate history with our Napoleons and Wellingtons. But it was better for the world that steam was demonstrated to be an active, manageable force, than that a French Emperor and his army should win the battle of Austerlitz. We have felt kindly to that philosophy which saw the consummation of human effort in the growing of two vines where one had grown before. For if war is valor and passion reduced to mathematics, how much better is peace, which gives valor and passion the exactness of algebra, and the wide, embracing scope of love and reason! "Peace," says Milton, "hath her victories no less renowned than war," and when a Napoleon of peace, like the dead Morse, has passed away, and we come to sum up his life, we gladly see that the world is better, society more generous and enlarged, and mankind nearer the ultimate fulfilment of its earthly mission, because he lived and did the work that was in him.

A man like Morse is a creation of that philosophy by which Bacon has so long governed the intellect of the world. In the same rank of heroes of peace we place Franklin, Fullerton and Stephenson. The newer inventions by no means dim the lustre of the old ones. Steam was the natural precursor of the telegraph. We had an agent which had shown how space could be controlled. Morse gave us an agency by which time was destroyed. If General Washington had been informed that man of the present time would sit in his seat while the words of an inaugural address were read on the Pacific long before the President had ceased to deliver it on the Atlantic; if he could have seen the United States and England united by a tie so subtle and so immediate in its effect that no war could sever it, he would have felt, that the mother country and her proud, imperial daughter, were united by a tie which no war and no revolution could sever. We have seen science nullify war. We are nearer Great Britain to-day in all that constitutes a nation's happiness, more closely concerned with the politics, the literature, the social joys and pleasures of her people, than before the Revolution. War divides nations; science unites them and carries out in silence and certainty the Divine decree, which seems to will that the nations shall come more closely together, and that the children of men shall become as it were of the same family.

If these achievements are the fulfilment of the higher destinies of mankind, then Franklin and Fulton and Stephenson belong to the highest rank of heroes. They are the masters after all. How much more truly may the same be said of the illustrious American who was gathered to his fathers yesterday evening! The story of his life is told elsewhere. The results of his life are known to all men. The lesson we gather from it is as old almost as human genius and human ambition. Effort, disappointment, derision, detraction, envy, strife, that deferred hope that maketh the heart sick, weariness, fainting by the way, almost despair—is it not written again and again in the history of men who are called upon to serve their fellow-men? Do we envy those who win the fame and glory of Morse? Let us think of the others who had perhaps this heaven-inspired and far-reaching spirit, and who failed in their struggles. When we see the argosy, laden with the stuffs and gems and spices of the East, and think of her angry voyage and the safe arrival in port, should we not think of those who sailed amid breezes as auspicious only to shiver and rend and sink? We honor Morse because he succeeded. We are told that the worship of success is selfishness, and that generous appreciation would honor as highly the men who dared nobly only to fail. When men who succeeded as Morse, suffer as he did, we can feel that their triumphs were fully earned. We see in this man's life what can be done by patient, resolute endeavor, courage, cheerfulnes, belief in his mission. Let others sing the glory of his achievements and descant upon his services to the world—his honors, his possessions, his ripe and reverend years—the rare blessings that crowned and capped his life. We see in his career the success that patient merit will always win when sustained by honor and courage. The life of Morse is full of lessons; but this, if we learn it truly, is the most precious of them all.—*N. Y. Herald.*

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
April 15, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since April 1, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

145	Acton, S. C.	66	Nesquehoning, Pa.
319	Belle River, Ill., re-opened	*	Ossipee, N. H.
84	Beavertown, Pa.	52	Odenwelder, Pa., check Easton, Pa.
253	Batesville, Ind.		
456	Blocks, Mo.	480	Oakwood, Texas
140	Catfish, Pa.	66	Penobscot, Pa., heretofore an Other Line office
294	Columbiana, Ala., re-op'd		
66	Coalport, Pa., check Mauch Chunk, Pa.	84	Painter, Pa.
		66	Rockport, Pa., heretofore an Other Line office
*	East Wakefield, N. H.		
270	Edwardsburg, Mich.	66	Solomons Gap, Pa., check Penobscot, Pa.
58	Gardners Switch, Pa.		
87	Garysburg, N. C.	66	So. Wilkesbarre, Pa., check Wilkesbarre, Pa.
219	Goodmans, Fla.		
66	Leslies Run, Pa., check White Haven, Pa.	58	Spring Brook, Pa., heretofore an Other Line office
46	Milford, Pa., heretofore an Other Line office	66	Silver Brook, Pa.
		336	Toulon, Ill,
84	Middleburg, Pa.	318	Tuscola, Ill.
84	McClure, Pa.	66	Tamanend, Pa.
397	Mt. Sterling, Iowa	*	Wakefield, N. H.
151	Martins Ferry, O.	66	Walnutport, Pa., check Lehigh Gap, Pa,
47	Morrisville, Pa.		
58	Mill Creek, Pa., heretofore an Other Line office	*	West Ossipee, N. H.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.	*Leaves this Line.*
East Wakefield, N. H.....	25 2	Great Falls, N. H.
Ossipee, N. H.....	25 2	"
Wakefield, N. H.....	52 2	"
West Ossipee, N. H.....	25 2	"

OFFICES CLOSED.

Blakely, Ala.; Big Cabin Creek, Ind. Terr.; Keechie, Tex. and Montezuma, Ga.

GENERAL INFORMATION.

The following is a revised list of offices on the Mo. River, Tel. line with "tariff for Other Lines," from Sioux city, Iowa:
Elk Point, Dac..... 45 and 5 Springfield, Dac.....125 and 10
Fort Randall, Dac,..200 and 15 Vermilion, Dac..... 65 and 8
Fort Scully, Dac....300 and 20 Yankton, Dac.....100 and 10

The Missouri River Tel. Co. make no charge on government business on their line, consequently on this business the W. U. government rate, to or from Sioux City, only should be collected.

Business for Fort Ellis, Mont., may be taken and sent to Boseman, Mont., from which point it will be mailed; also, business for Camp Baker, Mont., may be sent to and mailed from Helena, Mont.

On and after May 1, "Half-rate" messages will be taken for and received from St. John, N. B., and Halifax, N. S.

The P. O. adds. of Cornwells, Pa., is Andalusia, Pa., and that of Goldsboro, Pa., is Etters, Pa.

The square for Cherokee, Ks., will hereafter be 467 instead of 457.

Saugatuck and Westport, Conn., are one and the same place, messages and letters should be addressed Saugatuck, Conn.

Townsend, Del., will hereafter be checked direct.

ATLANTIC CABLE BUSINESS.

We are informed that telegraph communication is now open with the following islands in the Grecian Archipelago, and to seaports in Turkey, in Asia:

The messages are forwarded via. Falmouth.

London to		*Twenty words.*
Greek Islands.	Crete, Canea, Retimo,	$6 62
	Cyprus,	6 00
	Mytilene, Rhodes, Samos, Scio,	5 75
Turkey in Asia Seaports.	Marmorice, Latakia, Scalanova,	5 38

Half-rate for every additional ten words, or fraction of ten words.

Hereafter, all messages for China and Japan, will be forwarded by either the Falmouth or Russian lines, unless otherwise specially directed by the sender.

The rates by those routes are the same as now in force, with the exception that the tariff to Nagasaki, Japan, by the Russian route, is raised to $26.50, to correspond with that of the Falmouth cable.

If senders require messages to be forwarded by other routes, the words "Via Teheran," or "Via Turkey," must be inserted and paid for, and the ordinary continental rates charged, viz:—To Hong Kong, $35.00; to Shanghai, $41.25; to Nagasaki, $46.25.

WILLIAM ORTON, Pres't,

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DEAD!

Stat Magni Nominis Umbra—In Memoriam Professor S. F. B. Morse.

BY ROSA VERTNER JEFFERRY.

Thrill it down the electric wire,
Far and near, to town and mart;
Flash that word in prisoned fire
Through the world's enlightened heart;
Where the pallid North reposes,
Where the avalanche is born;
Whisper it unto the roses
Blushing round the "Golden Horn;"
Send it South from Scotia's mountains—
From her eagle's misty nest—
To the spray of Persian fountains,
Breaking on the bul-bul's breast;
From the Alpine torrents seething,
Thrill it—dumb amidst their swell—
To the amorous zephyrs breathing
Through Italia's "golden shell;"
Go where Spring her pale bloom nurses;
Flash it down the Russian steeps
To red Vesuvius, muttering curses
By Campania's purple deeps;
To the royal Adriatic
Venice on her ocean throne—
And through spice-groves aromatic,
Southward to the torrid zone!
He has written us a story
On the earth in pulsing lines
From our northlands, bleak and hoary,
To where the blue Marmora shines,
Through the deep track of the ocean,
Flashing past the coral isles,
Viewless, voiceless, without motion,
Thrills his fame down countless miles.
On to Oriental Cairo,
Past that waste where Egypt flings
Her glory from the tomb of Pharaoh,
A gauntlet unto living kings—
Where broods her ancient sphinx, abashing
Modern problems to the last
He sends a present wonder, flashing
Defiance at the stony past!
Men of every faith and nation
Honor, love, revere, admire
One who sought not adulation
When he chained the electric fire;
Who, discouraged and defeated,
Bore it with a patient grace;
By no boastful pride elated,
When he conquered time and space.
Faithful spirit, all undaunted,
Toiling, undismayed, for years,
Till along the wires enchanted
Greetings joined two hemispheres!
Then! all earthly praise despising,
With one holy, prayerful thought,
His fiery servant thus baptizing—
"Mark ye what the Lord has wrought!"—
Fervent hallelujah springing,
Breathless down the electric vein.
Mighty mind!—those wires are winging
Now through earth one sad refrain,
"The master's dead,"—their wail is flying
"Ye shall see his like no more!"
North winds sob to south wind dying
On the Byzantian shore!
Down the iron vein it shivers,
Potent, fervid, burning stream!
On through forests, deserts, rivers,
Passing time, and winds, and steam!
Subtle, flameless, harmless fire,
The wail of nations down it springs
So silently, that on the wire
Wild birds perch and plume their wings!
He had lived a great magician
In the dark and heathen age;
Lights that scatter superstition—
Faith and science—call him "sage."
Sage and hero, loved of nations
Lo! thy dauntless soul has found
The lightning's mystic habitation,
Where its lurid bolts are bound!
Couldst thou send a message thrilling
Earthward, it would be once more
"Eureka"—"on! your task fulfilling;
In God's name, Excelsior!"

LEXINGTON, KY., April 6, 1872.

SENATOR FRELINGHUYSEN has introduced a bill in the United States Senate to facilitate telegraphic connection between Asia and America.

WESTERN UNION TELEGRAPH COMPANY, Wednesday, April 3d, authorized the issue of bonds of the Company, for $1,500,000 to meet the remaining instalments of the purchase money of real estate bought by the Company at the corner of Dey street and Broadway, and for the erection of a building thereon.

LONDON, April 9.—A circular is issued inviting subscriptions for 45,000 shares in the Great Western Telegraph Company, which proposes to lay telegraph cables direct from England to New York, and thence to the West Indies. The shares are twenty pounds sterling each. The total capital of the company is fixed at £1,350,000. The Hoopers will make and lay the cable for £1,330,000

THE cable announces that final arrangements have been made by the French Atlantic Cable Co. with the London Telegraph Maintenance Co. for the laying of a fourth Atlantic cable, the prospectus of which will be immediately issued. It is designed to lay this cable with the termini at Milford Haven, on the coast of Wales, and Rye Beach on the coast of New Hampshire. This cable is to be laid in anticipation of future necessities, or in the experiment of reduced rates of charge. The present cables are forwarding with ease all the business at present offered.

WE have had placed upon our desk, by an excellent young lady, on behalf of the Ladies' City Department, 145 Broadway, N. Y., a most superb bouquet of fresh flowers, the odors from which speak of the kindness which led to the presentation of this very unexpected gift. It was accompanied with the following pleasant note:

DEAR SIR.—In several instances you have, very kindly, remembered the ladies of the City Department, each time your kindness being appreciated by us all.

Please accept, with our compliments and good wishes for your future happiness and prosperity, the accompanying basket of flowers from THE LADIES OF THE CITY DEPARTMENT.

So you see we have had our reward. The lips of the reverend old man whom we kissed for these ladies last summer, are now cold in death, but the affectionate salutation is returned to us in living flowers, which we accept with great delight, happy if, in anything we have done, we have duly merited them.

TO MEET any desire which may exist to have a likeness of Professor Morse, we offer to send three good engravings of him to one address, on roller, post paid, for twenty-five cents.

IN *Les Mondes* we find a proposed plan for replacing the oil signal-lamps of ships by an electric light derived from a magneto-electric apparatus, set in motion by a screw which is rotated by being drawn through the water by the ship.

WE have to thank Mr. H. N. Drury, of the Western Union Telegraph Office, Burlington, Vt., for a splendid brick of maple sugar. Mr. Drury was sweet, also, on Gen. Eckert, Mr. Prescott, and Mr. Abel, each of whom received a sacharine brick like our own. A sweet man is Mr. Drury.

THE SERVICE.

WESTERN UNION TELEGRAPH CO.

COMPILED BY E. C. COCKEY, ESQ.

Appointments.

Name.	*Place.*
OPERATORS.	
F. Bradnach	Gen'l Operating Dept., New York.
B. F. Herrington	" "
H. S. Martin	" "
Wm. Riddle	Canal street, New York.
J. J. Stephenson	Gen'l Operating Dept., New York.
C. R. Stevens	" "
H. F Thurber	" "
T. M. Weller	" "
W. S. Williams	" "
G. E. Lydiard	Berwick, Nova Scotia.
J. W. Wortman	Sussex, New Brunswick.
MANAGER.	
C. A. Tinker	St. Albans, Vermont.
OPERATORS.	
Miss A. E. Wheeler	Amherst, Massachusetts.
Miss M. O. Harlow	Canton, Massachusetts.
F. S. Burnett	Cheshire, Connecticut.
Miss N. H. Avery	Putnam, Connecticut.
J. W. English	Rochester, Connecticut.
C. N. Speakman	Ashland, Pennsylvania.
I. L. Osmond	Bordentown, New Jersey.
E. S. Ely	Dover, New Jersey.
I. H. Simpson	Easton, Pennsylvania.
V. P. Smith	Harrisburg, Pennsylvania.
C. L. Rogers	Newark, New Jersey.
A. Winlack	New Philadelphia, Pennsylvania.
S. S. Garwood	Philadelphia, Pennsylvania.
I. H. Pippitt	Scranton, Pennsylvania.
R. Mulford	Salem, New Jersey.
H. B. Smith	Smithville, New Jersey.
I. R. James	Trenton, New Jersey.
W. Pearson	Trenton, New Jersey.
Dr. A. Smith	Wernersville, Pennsylvania.
MANAGER.	
L. Whitney	Washington, D. C.
OPERATORS.	
W. M. Ash	Westchester, Pennsylvania.
G. E. Payne	Arkport, New York.
L. T. Graham	Cornwallis, West Virginia.
P. H. McAleer	Ellicott City, Maryland.
W. B. Lamar	Point of Rocks, Maryland.

Resignations.

OPERATORS.	
T. Douglass	Beaver and William Sts., New York,
C. E. Higdon	Gen'l Operating Dept., New York.
A. R. Sayre	" "
R. J. Williams	" "
Miss Kate B. Belknap	City Department "
R. H. Martin	Gen'l Operating Dept. "
E. Hoyt	Kentville, Nova Scotia.
A. E. Cannon	Point Duchene, New Brunswick
J. J. Wallace	Salisbury, New Brunswick.
Miss A. Hutchinson	Amherst, Massachusetts
Miss E. F. Beals	Canton, Massachusetts.
H. W. Doolittle	Cheshire, Connecticut.
Miss L. E. Post	Putnam, Connecticut.
N. E. Thompson	Springfield, Massachusetts.
G. H. Prescott	Boston Post Office, Massachusetts.
C. Sedam	New Brunswick, New Jersey.
Theo. Holt	Washington, D. C.
W. I. Courter	Bordentown, New Jersey.
F. P. Mortimer	New Philadelphia, Pennsylvania.
J. F. Knapp	Philadelphia Pennsylvania.
J. H. Simpson	Philadelphia, Pennsylvania.
J. Moffatt	Scranton Pennsylvania.
J. W. Long	Salem, New Jersey.
D. D. Kennedy	Trenton, New Jersey.
Miss R. I. Lee,	Tuscarora, Pennsylvania.
MANAGER.	
C. A. Tinker	Washington, D. C.
OPERATORS.	
A. R. Carroll,	Cornwallis, West Virginia.
G. R. Marquette,	Point of Rocks, Maryland.

Deceased.

OPERATORS.	
Miss Kate M. Denny	Easton, Pennsylvania.
Miss E. Sammis	Quarantine, Long Island

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THE FATHER OF THE TELEGRAPH.

New York, April 2.—Professor Morse died at seventeen minutes before eight this evening.—[Telegraph.

If it is legitimate to measure a man by the magnitude of his achievements, the greatest man of the nineteenth century is dead. Some days ago the electric current brought us the intelligence that S. F. B. Morse was smitten with paralysis. Since then it has brought us the bulletins of his condition as promptly as if we had been living in the same square, entertaining us with hopes which the mournful sequel has proven to be delusive; for the magic wires have just thrilled with the tidings to all nations that the father of telegraphy has passed to the eternal world. Almost as quietly as the All-seeing eye saw the soul depart from that venerable form, mortal men, thousands of miles distant, are apprised of the same fact by the swift messenger which he won from the unknown—speaking, as it goes around its world wide circuit, in all the languages of earth. There is something peculiarly suggestive in this mysterious element, simultaneously penetrating the newspaper offices, the exchanges, the legislative halls, the courts and the cabinets of all nations, to whisper the mournful news that the benificent genius to whom it owes its introduction among men, has faded into the unknown world from which he rescued itself, and vanished from earth forever.

Letters came to the aid of the individual mind and increased its energies by extending the circle of hearers, and propagating its utterances through succeeding generations. But the grand supplement of Professor Morse has made the world a neighborhood. Letters defied time; the telegraph has annihilated both time and space. It leaps across the expanse of the ocean with its message as easily as if it were a brook. Not fatigued by climbing mountains and traversing thousands of miles in its journey, it crosses a continent on its errand as quickly as another messenger would cross the street.

To Americans the telegraph possesses the special significance of making that form of government practicable for a continent which has hitherto been available only for cantons or cities, by means of bringing remote sections into practical every-day intercourse, and into familiarity and homogeneity. Antecedent history does not record a single instance of a successful republic on a large scale. The arch has been found to be weak. But, now however, and without entering further into the subject, let it suffice to say that, if a republican form of government is practicable for a city or canton, the magic of telegraphy has made it equally o for a confederation of populous States.

To appreciate the inventor we must appreciate the invention. We have, therefore, enumerated a few of its wonderful achievements and faculties. Its influences upon the world are merely beginning to develop, as its uses, conveniences and improvements are only beginning to unfold. When telegraphy was in its earlier infancy, the world, with more than its usual justice, hastened to crown the great inventor with distinctions and honors. Prussia, France, Wurtemberg, Austria, Denmark, Spain, England the United States, and even Turkey, testified their appreciation of his services to mankind by gifts of money and badges of distinguished knightly orders. Though this invention affords another marked illustration of the parallelism of contemporary minds—two other inventors having made simultaneously near approaches to Morse's discovery—yet, in the estimation of the world at large, none divided his honors with the immortal American. The same remarkable fact attended the discoveries in electricity by Dr. Franklin; and as mankind have readily conceded that the earlier sage may justly claim the merit of bringing the lightning down from the heavens, it will be even more frankly admitted that Morse may claim the honor of seizing and binding it in the service of men.

Professor Morse took no royal road to this discovery. Indeed, it is never a characteristic of genius to seek such roads. He was dependent necessarily upon facts and principles brought to light by similar diligent, patient minds, which had gone before him. Volta, Galvoni, Morcel, Grave, Faraday, Franklin, and a host of others had laid a basis of laws and theories upon which he humbly and reverently mounted and arranged his great problem for the hoped-for solution. But to him was reserved the sole, undivided glory of discovering the priceless gem, "richer than all its tribe," which lay just beneath the surface, and around which so many *savans* had vainly and blindly groped.

He is dead, but his mission was fully completed. It has been no man's fortune to leave behind him a more magnificent legacy to earth, or a more absolute title to a glorious immortality. His was a life such as to awaken the passionate enthusiasm and plaudits of the multitude, as it was a life somewhat sequestered, and altogether devoted to a task which lay in the cold, unsympathetic domain of natural science. There is no doubt, however, that to the honor of being one of the most distinguished benefactors of the human race, he added the personal and social graces and virtues of a true gentleman and a Christian philosopher. The memory of his private worth will be kept green amid the immortelles of sorrowing friendship for a lifetime only, but his life monument will endure among men as long as the human race exists upon earth.—*Courier-Journal, Louisville, Ky.*

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

On the election of Mr. A. S. Brown to the Treasurership of the Telegraphers' Mutual Life Insurance Association, we addressed him the following letter, which we give for the information of all concerned.

New York, April 1, 1872.

A. S. Brown, Esq., Treasurer elect, &c.

Dear Sir:—It is pleasant to me to know that the Association, with so much heartiness and unanimity, have elected you to succeed me. They could not have selected one in whose hands their interests will be more secure, or under whom the designs of the Association will be more fully carried out.

At this date there have been 1512 Certificates issued, and 29 Assessments called. With this large membership it seems somewhat disappointing to find that probably 700 of these are either dead, resigned, too poor, too unsteady, or otherwise withdrawn from the Association. Much of this was, indeed, to have been expected. Young men are constantly entering new pursuits, and regard themselves thus cut off from telegraphic bonds. Young women marry, and drop their membership. Many change their residence, and notices do not reach them. The difficulty and cost of remittance also has caused a large number to resign. When District Treasurers are appointed in the several States it will remove one large cause of the difficulties which have been in the way of its growth, and will secure a steadier and better satisfied membership.

The following is the condition of the Treasury as it now passes to your hands, minus whatever interest may meanwhile have accrued:

Balance at credit of expense acc't Nov. 1, '71,	$340 38
256 certificates, 50c. each, to expense acc't,	128 00
From new certificates yet unpaid to heirs.	131 00
On hand for Assessment No. 25,	746 00
" " " 26,	705 00
" " " 27,	674 00
" " " 28,	79 00
" " " 29,	39 00
" for advance assessments,	55 00
	$2,897 38
By printing new certificate books, envelopes, &c.,	$49 30
Desk for Secretary,	30 00
Postage stamps,	14 00
Assistance,	20 66
New books of entry, envelopes, &c.,	33 00 146 96
At your credit,	$2,770 42

RECEIPTS FOR ASSESSMENTS NOT YET CALLED.

James D. Reid, 30 31 32 33 34 35 36 37 38 39 40	$11 00
H. Frank Thurber, 30	1 00
F. H. Zimmerman, 30 31	2 00
W. W. Smith, 30 31 32	3 00
W. W. Kelchner, 30	1 00
John Campbell, 30	1 00
C. K. Skinner, 30	1 00
Martin Barth, 30 31	2 00
Charles D. Camp, 30 31	2 00
J. B. Tree, 30	1 00
G. M. Dugan, 30 31	2 00
John M. McDonald, 30 31	2 00
Fernando E. Norcrass, 30 31	2 00
B. B. Adams, Jr., 30	1 00
John Kennan, 30	1 00
J. D. Easterlin, 30 31 32 33 34	5 00
George S. Shepard, 30 31	2 00
Francis K. Mead, 30	1 00
S. M. Hunter, 30	1 00
W. Wallace Shock, 30	1 00
John Lonergan, 30 31 32	3 00
M. H. Bacon, 30 31	2 00
Francis Benner, 30	1 00
R. L. Guion, 30 31	2 00
C. A. Thomas, Aspinwall, 30 31 32 33	4 00
	$55 00

The accumulation of money shown by this statement has been caused, as you know, by the rapidity with which one death has followed another during March, and the incomplete state of the assessment delaying any possible settlement with heirs. The time fixed by the Board for settling claims, sixty days after making the assessment, will expire in the case of assessment No. 25 with April 8th, it having been issued about February 8th, and will be payable to the heirs of George Henry Patriquin, of Port Hastings, Cape Breton. Assessment No. 26, payable to the heirs of Naylor L. Brown, of Athens, Tenn., will be due a month later, and which will give time to secure, we trust, a number of payments as yet withheld. Many will no doubt feel discouraged at the recent mortality, but any one noticing the average of the year will easily see that the year's payments are not more than at most one-third of the cost of insurance in the cheapest of Insurance Companies, and is besides a source of brotherly help which should be loyally maintained aside from any personal advantages which might accrue from its membership.

Hoping that under your good guidance the Association will greatly enlarge its usefulness, and with an affectionate farewell to you and all the widely scattered memberhood to whom I have come to feel attached as a brother and friend, believe me,

Yours sincerely,

James D. Reid.

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TELEGRAPHERS INSURANCE ASSOCIATION.

The receipts since April 1 are large, amounting to about $1,200, but for which we have no room.

RECEIPTS FOR ASSESSMENT NO. 26 TO APRIL 1, 1872.

4	5	6	8	16	21	23	25	26	28	30
44	46	49	52	53	54	55	56	59	60	67
69	70	72	76	77	78	80	83	88	89	90
91	93	98	99	101	103	107	113	114	117	121
122	126	129	131	133	134	136	138	139	141	142
143	144	145	146	148	150	154	156	157	158	160
162	164	166	169	172	175	176	179	181	183	185
186	187	192	199	201	202	209	210	217	220	227
228	231	232	233	235	238	239	240	242	243	244
245	247	248	251	253	254	255	256	257	258	259
262	267	273	274	275	276	278	279	280	281	282
283	285	286	289	291	294	297	303	312	327	328
330	340	343	344	346	347	349	351	352	357	359
360	361	364	366	367	371	376	382	383	385	391
392	393	394	398	402	405	406	413	416	418	420
425	226	430	431	433	441	445	451	453	454	455
457	461	466	467	468	469	470	471	474	475	476
481	482	483	508	510	514	515	520	524	526	527
528	532	533	536	546	547	548	549	553	554	555
556	557	562	566	573	575	577	581	590	592	594
602	608	623	627	628	629	632	646	649	655	661
662	663	664	665	669	670	671	672	676	678	679
680	684	685	690	695	697	698	701	703	704	705
711	714	715	717	720	721	722	723	724	725	726
728	730	732	733	734	735	737	738	741	742	743
744	750	751	756	763	766	769	772	775	776	781
782	783	785	786	791	797	798	799	800	802	803
804	812	815	817	820	821	822	823	825	831	832
836	838	841	842	848	858	869	871	873	874	875
876	880	883	886	896	897	899	901	904	907	908
911	912	915	916	920	922	923	926	932	938	940
941	944	945	946	949	952	954	955	956	957	958
959	960	963	964	966	976	978	980	991	992	995
996	998	1000	1002	1003	1005	1011	1013	1023	1025	1029
1030	1031	1032	1033	1034	1038	1039	1040	1042	1047	1050
1054	1055	1059	1061	1062	1063	1069	1071	1073	1074	1075
1076	1079	1081	1085	1087	1088	1090	1091	1093	1099	1102
1111	1125	1126	1134	1135	1136	1137	1141	1142	1143	1144
1145	1146	1147	1148	1149	1152	1153	1166	1168	1169	1173
1174	1175	1180	1181	1182	1183	1191	1192	1193	1194	1195
1196	1198	1200	1201	1204	1205	1208	1213	1214	1216	1217
1218	1221	1223	1224	1225	1226	1228	1229	1231	1232	1233
1234	1235	1241	1242	1243	1248	1252	1254	1257	1258	1260
1262	1263	1264	1265	1266	1268	1269	1270	1271	1273	1274
1276	1277	1282	1283	1284	1285	1286	1289	1290	1293	1294
1295	1298	1300	1302	1303	1304	1306	1307	1308	1309	1311
1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322
1323	1324	1325	1326	1327	1328	1329	1330	1332	1333	1334
1336	1338	1339	1340	1341	1342	1343	1344	1345	1346	1348
1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359
1362	1363	1364	1365	1366	1367	1371	1372	1375	1376	1378
1379	1381	1383	1385	1386	1387	1388	1389	1390	1391	1392
1393	1394	1395	1396	1397	1398	1402	1403	1404	1406	1407
1408	1409	1410	1412	1413	1414	1416	1419	1420	1421	1422
1423	1425	1427	1428	1429	1430	1431	1432	1433	1434	1435
1436	1437	1438	1439	1440	1443	1444	1445	1446		

RECEIPTS ON ASSESSMENT NO 27 TO APRIL, 1, 1872.

4	5	6	8	16	21	23	25	26	27
28	30	44	46	49	52	53	54	55	56
59	60	67	69	72	76	77	78	80	83
88	89	90	91	93	95	98	99	101	103
107	113	114	117	121	122	126	129	131	133
134	136	138	139	141	142	143	144	145	146
148	150	154	156	157	158	160	162	164	166
169	172	175	176	179	181	185	186	187	192
199	201	202	209	210	211	217	220	227	22
231	232	233	235	238	239	240	242	243	24
245	246	247	248	251	253	254	255	256	257
258	259	262	267	273	274	275	276	278	279
280	281	282	283	285	286	289	291	294	297
303	312	327	328	330	340	341	343	344	346
347	349	351	352	353	357	359	360	361	364
366	367	371	372	376	380	381	382	383	385
391	392	393	394	398	402	405	406	413	416
418	420	425	426	430	431	433	441	451	453
454	455	457	459	463	466	467	468	469	470
471	474	475	476	481	482	483	508	510	514
515	520	524	526	527	528	532	533	536	546
547	548	549	553	554	555	556	557	562	566
573	575	577	581	590	592	594	602	608	622
623	627	628	629	632	639	646	649	656	661
662	663	664	665	669	670	671	672	676	678
679	680	684	685	690	695	697	698	701	703
704	705	711	714	715	717	720	721	722	723
724	725	726	728	730	732	733	734	735	737
738	741	742	743	744	750	751	756	763	766
769	772	775	776	781	782	783	785	786	791
797	798	799	800	802	803	804	812	815	817
820	821	822	823	825	831	832	836	838	841
842	848	850	858	869	870	871	873	874	875
876	880	883	886	896	897	899	901	904	907
908	911	912	915	916	920	922	923	926	932
938	939	940	941	944	945	946	949	952	954
955	956	957	958	959	960	963	964	966	976
978	980	991	992	995	996	998	1000	1001	1002
1005	1006	1011	1013	1014	1016	1019	1023	1025	1029
1030	1031	1032	1033	1034	1038	1039	1040	1042	1043
1046	1047	1050	1054	1055	1058	1059	1061	1062	1063
1069	1071	1073	1074	1075	1076	1079	1081	1087	1088
1090	1091	1099	1102	1111	1125	1126	1134	1135	1136
1137	1141	1142	1143	1144	1145	1146	1147	1148	1149
1152	1153	1166	1168	1169	1173	1174	1175	1180	1181
1182	1183	1191	1192	1193	1194	1195	1196	1198	1199
1200	1201	1204	1205	1208	1213	1214	1216	1217	1218
1221	1223	1224	1225	1226	1228	1229	1231	1232	1233
1234	1235	1241	1242	1248	1251	1252	1254	1257	1258
1260	1262	1263	1264	1265	1266	1268	1269	1270	1271
1273	1274	1276	1277	1282	1283	1284	1285	1286	1289
1190	1294	1295	1298	1300	1302	1303	1304	1306	1307
1308	1309	1311	1312	1313	1314	1315	1316	1317	1318
1319	1320	1321	1322	1323	1324	1325	1326	1327	1328
1329	1330	1332	1333	1334	1336	1338	1339	1340	1341
1342	1343	1344	1345	1346	1348	1349	1350	1351	1353
1354	1355	1356	1357	1358	1359	1362	1363	1364	1365
1366	1367	1371	1372	1375	1376	1378	1379	1381	1383
1385	1386	1387	1388	1389	1390	1391	1392	1393	1394
1395	1396	1397	1398	1400	1402	1403	1404	1405	1406
1407	1408	1409	1410	1412	1413	1414	1416	1419	1420
1421	1422	1423	1425	1427	1428	1429	1430	1431	1432
1433	1434	1435	1436	1437	1438	1439	1440	1443	1444
1445	1446								

RECEIPTS ON ASSESSMENT NO. 28 TO APRIL 1, 1872.

2	16	21	26	59	64	95	117	126	140
153	169	171	188	208	211	269	286	301	340
341	344	346	353	372	378	380	381	411	412
459	463	464	490	509	547	549	552	560	564
622	626	627	639	710	716	722	740	742	830
850	858	859	870	874	883	917	923	932	939
1001	1006	1014	1016	1019	1026	1043	1046	1058	1152
1182	1220	1222	1245	1251	1255	1266	1405	1482	

RECEIPTS ON ASSESSMENT NO. 29 TO APRIL 1, 1872.

2	59	64	117	140	153	169	188	211	269
286	301	344	346	378	381	411	412	459	509
549	552	560	564	626	627	639	740	830	858
859	870	883	917	932	1026	1058	1222	1255	1482

WE have had the pleasure of a visit of Mr. Cyrus A. Thomas, Telegraph Superintendent at Aspinwall, who, after four years' constant service in that sunny region, has come North to recruit. Mr. Thomas reports great activity in South American telegraphs where all the populations are thoroughly awake to the importance of telegraphic connection between their own ports and centres of commerce, and other nations. A line of 300 miles is being built by Mr. Stanley McNider, an old Canadian operator, connecting the capital of Salvador with the ports of La Union and Libertade, by one of the best built lines to be found anywhere. In Guatemala, also, extensive lines are in progress.

NOTHING NEW UNDER THE SUN.

Humboldt, in his *Cosmos*, states that the Chinese had magnetic carriages with which to guide themselves across the great plains of Tartary, one thousand years before our era, on the principle of the compass. The prototype of the steam engine has been traced to the æolipyle of Hero of Alexandria. The Romans used movable types to mark their pottery and indorse their books. Mr. Layard found in Nineveh a magnifying lens of rock cristal, which Sir D. Brewster considers a true optical lens, and the origin of the microscope. The principle of the stereoscope, invented by Professor Wheatstone, was known to Euclid, described by Galen fifteen hundred years ago, and more fully in 1599 A. D., in the works of Baptista Porta. The Thames tunnel, thought such a novelty, was anticipated by that under the Euphrates at Babylon; and the ancient Egyptians had a Suez Canal. Such examples might be indefinitely multiplied, but we turn to photography. M. Jobard in his *Nouvelles Invention aux Expositions Universelles*, 1857, says a translation from German was discovered in Russia, three hundred years old, which contains a clear explanation of photography. The old alchemists understood the properties of chloride of silver in relation to light, and its photographic action is explained by Fabricius in *De Rebus Metallicis*, 1566. The daguerreotype process was anticipated by De la Roche in his *Giphantie*, 1760, though it was only the statement of a dreamer.

WE have a number of complaints from parties who have remitted money to Messrs. Harvey & Dow, St. Johnsbury, Vermont, for badge-pins. Some of these we forwarded, asking the reason why orders were not filled. Receiving no reply, we withdrew the advertisement. We now have a communication from them, dated Lyndonville, Vt., which may explain the difficulty, and of which we hope soon to learn.

BORN.

LUDWIG.—February 20th, at 4 A. M., to Mrs. E. F. Ludwig, a daughter.

HOTALING.—To B. S. Hotaling, Manager W. U. Tel. and Agent Missouri, Kansas and Texas Ry., Chetopa, Kansas, a son, only an eight pounder, but a very good sounder. "'Rah for Ben."

SHAUTZ.—On the 27th of March, 1872,, to W. N. Shautz, Manager W. U. Telegraph Office, Blandon, Pa., was born a son, the fourth in 4 years, and all No. 1 sounders.

MARRIED.

LANE—PERSON.—On the 9th inst., by Rev. Gregory, at Middletown, Mr. Andrew Lane, Manager W. U. Office, to Miss E. A. Person, of Middletown. No cards.

HUNT—LAWSON.—On Tuesday evening, at the residence of the bride's brother, Fountain, Ind., by Rev. Morris Boatman, Mr. Harry C. Hunt, of Indianapolis, Ind., Agent and operator Indiana and St. Louis R. R., Fountain, Ind., to Miss Ollie A. Lawson, of Fountain, Ind. No cards.

SMITH—AUNGST.—On Wednesday, April 3d, at the residence of the bride's father, Decatur, Ill., by Rev. J. H. Noble, J. Manlove Smith, W. U. Telegraph, Rock Island, to Fidelia Aungst.

DIED.

BROWN.—Elliott H. Brown, Operator New York City, died at his parent's residence, Binghamton, N. Y., of rapid consumption, April 2, 1872, in the 24th year of his age.

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A BOY'S RECOMMENDATION.

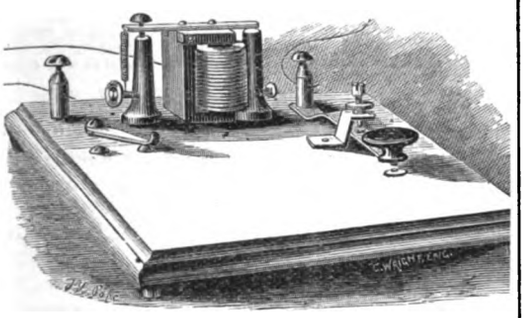
A gentleman advertised for a boy to assist him in his office, and nearly fifty applicants presented themselves to him.

"I should like to know," said a friend, "on what ground you selected that boy, who had not a single recommendation?"

"You are mistaken," said the gentleman, "he had a great many. He wiped his feet when he came in, and closed the door after him, showing that he was careful. He gave up his seat instantly to that lame old man, showing that he was kind and thoughtful. He took off his cap when he came in, and answered my questions promptly and respectfully, showing he was polite and gentlemanly. He picked up the book which I had purposely laid upon the floor, and replaced it on the table, while all the rest stepped over it or shoved it aside, and he waited quietly for his turn, instead of pushing and crowding, showing that he was honest and orderly. When I talked with him I noticed that his clothes were carefully brushed, his hair in nice order, and his teeth as white as milk; and when he wrote his name, I noticed his finger-nails were clean, instead of being tipped with jet, like that handsome little fellow's in the blue jacket. Don't you call those things letters of recommendation? I do, and I would give more for what I can tell about a boy by using my eyes ten minutes than all the letters he can bring me."

THE NONPAREIL TELEGRAPH APPARATUS.

(Patent applied for.)



This apparatus supplies a want which has long been felt, viz.: that of a SIMPLE and CHEAP

MORSE TELEGRAPHIC INSTRUMENT,

with all the necessary Batteries and other appurtenances in a CONVENIENT and COMPACT form.

By means of a switch, which is now placed on each instrument, they can be worked as desired, either as the open or the ordinary continuous, or closed circuits.

It is intended especially for the use of

STUDENTS, AMATEURS, AND OPERATORS,

but will be found to be equally well adapted for use on

PRIVATE TELEGRAPH LINES,

or Short Lines of any description, which are not over three or four miles in length.

A NEW FORM OF BATTERY

is employed, which is compact, efficient, and economical, and especially adapted to the purpose for which it was designed. Each instrument will be accompanied by a

BATTERY, CHEMICALS, INSULATED WIRE for connections, together with an

ILLUSTRATED BOOK OF INSTRUCTIONS,

which in itself forms a complete elementary treatise upon the ART OF TELEGRAPHY.

PRICES:

Single Instrument, complete, with Batteries, etc.....$8 00
Two Instruments, " " " " 15 00

Sent by Express on receipt of price.

Remittances may be made by Post Office Order, Registered Letter, or Draft payable to our order. Persons ordering Instruments will please write plainly, giving Post Office, County, and State, with instructions for shipment. Address,

F. L. POPE & CO.,
P. O. Box 6010. 80 Broadway, (Room 51,) New York.

THE NONPAREIL TELEGRAPH APPARATUS may be procured through the leading dealers in Telegraph Supplies throughout the country.

SEND FOR A CIRCULAR.

16,000 MILES

OF

"JOHNSON'S" WIRE

USED BY THE

TELEGRAPHS OF THE UNITED STATES

DURING THE YEAR 1871.

This is sufficient refutation of all the intimations thrown out by the Manufacturers and Importers of other Wires, reflecting upon the acknowledged superiority of the Wire manufactured by

Messrs. RICHARD JOHNSON & NEPHEW,

MANCHESTER, ENGLAND.

Their Works are the Largest in the World.

The great advantage which they possess over other manufacturers is their patent process of drawing Wire in great lengths (averaging 1,200 feet).

All Telegraphers know that, in nine cases out of ten, breaks in Wire occur at joints, hence the less joints the fewer breaks.

Messrs. RICHARD JOHNSON & NEPHEW furnish three-fourths of all the Telegraph Wire used by the

ENGLISH GOVERNMENT.

This Wire is necessarily subject to the tests, etc., imposed by the English Post-office Department.

A large stock always on hand and for sale at the lowest market prices—both free and in bond.

TELEGRAPH LINES

OF ANY LENGTH FULLY EQUIPPED WITH

Wire,
Insulators,
Batteries,
Instruments, &c.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET,

NEW YORK.

Sole Agents for "Johnson's" Wire.
" " " American Compound Wire.
" " " Cauvet's Patent Screw Insulator.
" " " Sam'l C. Bishop's Insulated Wires and Cables.
" " " Brooks' Patent Paraffin Insulators.

Manufacturers of every description of

TELEGRAPH APPARATUS.

CALLAUD BATTERY,

KEPT ON HAND,

AND

Orders filled by

H. R. DAVID,

17 Platt Street, New York,

W. MITCHELL McALLISTER,

728 Chestnut Street, Philadelphia,

CHARLES WILLIAMS, Jr.,

109 Court St., BOSTON, MASS.

AND BY

GRAY & BARTON,

Agents for the United States,

479 State St., Chicago, Ill.

AMERICAN FIRE ALARM

AND

POLICE TELEGRAPH.

GAMEWELL & CO., PROPRIETORS,

NO. 104 CENTRE STREET, NEW YORK.

J. W. STOVER,
General Agent and Superintendent.

L. B. FIRMAN, Chicago, Ill.,
General Agent for the West and North West.

J. R. DOWELL, Richmond, Va.,
Special Agent for Virginia and North Carolina.

J. A. BRENNER, Augusta, Ga.,
Special Agent for Georgia and South Carolina.

L. M. MONROE, New Canaan, Conn.,
Special Agent for New England.

This system of Fire Alarm and Police Telegraph, with a Central office, or upon the

AUTOMATIC PLAN,

is now in operation in the following cities, to which reference is made for evidence of its great SUPERIORITY, VALUE and UNIFORM reliability:

Albany, .N Y.,	New Orleans, La.,
Alleghany, Pa.,	New Haven, Conn.,
Boston, Mass.,	Newark, N. J.,
Buffalo, N. Y.,	Omaha, Neb.,
Baltimore, Md.,	Philadelphia, Pa.,
Chicago, Ill.,	Pittsburg, Pa.,
Cincinnati, Ohio,	Portland, Me.,
Columbus, Ohio,	Peoria, Ill.,
Cambridge, Mass.,	Providence, R. I.,
Charlestown, Mass.,	Quebec, L. C.,
Covington, Ky.,	Rochester, N. Y.,
Detroit, Mich.,	Richmond, Va.,
Dayton, Ohio,	Indianapolis, Ind.,
Elizabeth, N. J.,	St. Louis, Mo.,
Fall River, Mass.,	St. John, N. B.,
Fitchburg, Mass.,	Springfield, Mass.,
Hartford, Conn.,	San Francisco, Cal.,
Jersey City, N. J.,	Savannah, Ga.,
Louisville, Ky.,	Syracuse, N. Y.,
Lawrence, Mass.,	Troy, N. Y.,
Mobile, Ala.,	Toledo, Ohio,
Montreal, Canada,	Toronto, Canada,
Milwaukee, Wis.,	Washington, D, C.,
New York City,	Worcester, Mass.,
Lynn, Mass.,	New Bedford, Mass.,
Lowell, Mass.,	Bridgeport, Conn.

The distinctive features of these systems of

FIRE ALARM AND POLICE TELEGRAPHS,

ARE,

First—The AUTOMATIC SIGNAL BOXES, the simple electro-mechanism of which enables any one—even a child—to give an *instantaneous*, *general*, and *definite* alarm of fire.

Second—The AUTOMATIC REPEATER, through which the apparatus may be distributed in a combination of circuits, and the entire system successfully worked without the constant personal attention of either operators or watchmen.

Third—The ELECTRO-MECHANICAL BELL STRIKERS, adapted to produce the full tone of the largest church or tower bells.

Fourth—The ELECTRO-MECHANICAL GONG STRIKER, for hose and engine houses, by means of which the location of the fire is instantaneously communicated to the members of each fire company.

These features combined form the

ONLY PERFECT, COMPLETE, AND RELIABLE SYSTEM

OF

FIRE ALARM TELEGRAPH IN THE WORLD.

Messrs. GAMEWELL & CO. are the owners of the original *FARMER AND CHANNING PATENTS*, one of the most important of which has just been extended for seven years. During the past seventeen years they have spared no expense or effort to secure improvements, and the systems are now covered by

MORE THAN TWENTY PATENTS.

The introduction and operation of the

AUTOMATIC SYSTEM

involves so little expense, compared to the benefit which it confers, that even small communities can profitably adopt and maintain it.

The co-operation of TELEGRAPHERS in securing its introduction into their localities is cordially invited, and their efforts will be duly appreciated and compensated.

Any information desired in regard to the above system will be cheerfully and promptly furnished upon application at the office.

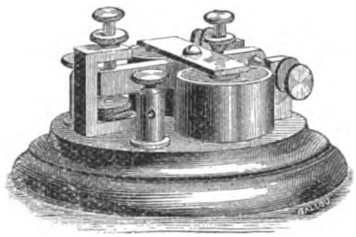
A pamphlet setting forth more fully its advantages and superiority, has been printed, and will be supplied to Municipal Authorities and others interested in Fire Alarm and Police Telegraphy upon application as above.

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M. A. BUELL,

Manufacturer and Dealer in all kinds of

Telegraph Supplies.



A VERY FINE NEW STYLE

SMALL SOUNDERS,

Polished Rubber Covered Magnets, $6.00.

The same, on Mahogany Base and Silver Plated, . . . $9.00

Agent for

Pope's Nonpareil Apparatus,

AND

PUTT & CO.'S MECHANICAL INSTRUMENTS

FOR LEARNERS.

Above Instruments kept constantly on hand at manufacturers' prices.

Materials for Private Telegraph Lines,

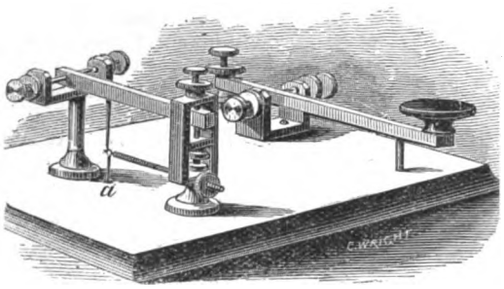
With instructions for putting up and operating.

M. A. BUELL,

26 Waring Block, Cleveland, Ohio.

MECHANICAL TELEGRAPH INSTRUMENT

PATENTED MAY 31st, 1870.



For Students, Colleges, &c. No battery required. An ordinary key and sounder is placed upon a proper base. The sounder is moved by a lever under the base, connected with the key, making a perfect instrument for those wishing to learn the Art of Telegraphy. An expert could not tell, without examining it, that the instrument was not worked by a battery.

It should be introduced into every school and family where there are those who wish to learn the Art.

Hundreds of persons throughout the country desire to become expert Telegraphists, and are constantly seeking permission to practice in the various telegraph offices.

This instrument is an outgrowth of this pressing demand. The Inventor is himself a practical operator, now in active service. Operators and others wishing to teach or learn the Art, will be delighted with this instrument.

It can be placed anywhere, as it does not occupy a space more than six inches square.

Its cost is but $7, and there is no expense whatever to keep it constantly in working order.

We will send a copy of SMITH'S MANUAL, free of charge, with each instrument, to individuals or clubs. The instructions in this Manual are particularly adapted to those who wish to learn by sound.

Special and liberal terms to manufacturers.

Remittances can be made by certified draft on New York, Cleveland, or Pittsburgh, money by express, charges paid, post office order, or registered letter at our risk.

Parties ordering instruments, from points except well-known cities, will please give the name of county and State.

Price, $7. Silver Plated, Extra Finish, $10.

Address, D. W. PUTT & CO.,
Wellsville, O.

D. W. PUTT,
P. BRUNER,
W. H. RILEY.

These instruments can also be procured at the same price from L. G. Tillotson & Co., New York; Bliss, Tillotson & Co., Chicago, Ill.; Chas. Williams, Jr., Boston, Mass.; M. A. Buell, Cleveland, O.

WIRE IN BOND.

For the accommodation of the
SOUTH AMERICAN, CUBAN and MEXICAN TRADE,
we shall hereafter keep a stock of the Celebrated

"JOHNSON" WIRE,

both plain and Galvanized, in Bond, ready for shipment from New York.

PRICES AS FOLLOWS:

No. 9, Plain Annealed	4½ cts. Gold.
No. 9, Galvanized	5¼ "
No. 8, Plain Annealed	4¾ "
No. 8, Galvanized	5 "

This Brand of Wire is the best in the world, and has been adopted exclusively by the Western Union and many other Telegraph Companies.

We also continue to import this Wire for use in this country, notwithstanding the high rate of duty imposed by Congress in the interest of the monopolists. Any amount of it can be seen at our store at all times. The import duty on wire is now two cents per lb. gold, and 15 per cent. *ad valorem*.

L. G. TILLOTSON & CO.,
No. 8 Dey Street, New York,
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247 So. Water Street, Chicago,

Sole Agents in the United States for "Johnson's" Wire.

Manufacturers of every description of

Telegraph Instruments, Battery and Line Material.

CHAS. T. & J. N. CHESTER,

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TELEGRAPH ENGINEERS,

And Manufacturers of

INSTRUMENTS, BATTERIES,

AND EVERY DESCRIPTION OF TELEGRAPH SUPPLIES,

Offer the best guaranty of excellence in their profession—in their long established business—in the extent and variety of their manufacturing facilities—in the many improvements introduced by them, now almost universally adopted or imitated—and in the extent of their business, domestic and foreign, enabling them to keep pace with telegraphic progress.

They publish an Illustrated Descriptive Catalogue of their lead- by manufacturers, to which they respectfully refer.

SCREW GLASS INSULATORS AND BRACKETS,

Of the size and thread used by the Western Union Telegraph Company.

Having secured an Exclusive Agency for these Insulators, (manufactured under the Cauvet patent,) we are filling orders promptly for large or small quantities, at prices as low as any Insulator can be sold for in the market.

GRAY & BARTON,

479 State St., Chicago.

CHARLES WILLIAMS, Jr.,

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Manufactures and has for sale the various kinds of

OFFICE AND MAGNET WIRES,

Including Cotton Covered, Silk, Gutta Percha, Painted, Fancy, and

DAY'S KERITE COVERED WIRE.

Also, a full assortment of

BATTERIES,

For Telegraphing, Plating, Electrotyping and Experimenting.

NATIONAL

Fine Art Foundry,

218 EAST 25th STREET, NEW YORK.

MEMORIAL FIGURES AND BUSTS,

ARTISTIC MONUMENTS, TOMBS, AND

FOUNTAINS, ALTAR RAILS, &C.

Estimates and Designs given.

Pickett's Statue of

PROFESSOR MORSE

erected at Central Park, was cast at this establishment.

M. J. POWER,

PROPRIETOR.

THE DARLING SELF-SUPPLYING PEN-HOLDER

CAN BE USED WITH ANY PEN.



WRITES TWO THOUSAND WORDS WITH ONE DIP OF THE PEN IN THE INKSTAND.

These Holders will be sent by mail, post-paid, on receipt of the price, on the following terms:

Cedar Holders, for Desk	$0 50
Ebony " "	0 60
Cedar " " Ex. Plated	0 75
Ebony " " Nickel Plated	1 00
Pocket Holders, Plain, " "	1 75
" " Chased, Ex. Plated	2 00
Six Cedar Desk Holders to one order	2 00

Send Registered Letter or Money Order for safety.

Address, W. A. COOKE, Agent,
No. 6 State Street, N. Y.

OPINIONS.

NEW YORK, March 15, 1871.

Telegraph operators especially will find it almost indispensable after once having used it. All who have used it in this business speak very highly of it.

FRANK L. POPE,
Associate Editor of the "Telegrapher."

NEW YORK, April 21, 1871.

I fully accord in the above opinion of the Self-Supplying Pen-Holder, having tested it for some time.

SAMUEL F. B. MORSE.

FRANK L. POPE,

TELEGRAPHIC AND ELECTRICAL ENGINEER,

Nos. 78 and 80 Broadway, Room 48,

NEW YORK.

WM. KIDD, A. BOODY. C. H. PEIRCE, C. S. OTIS.

KIDD, PEIRCE & CO.,

BANKERS,

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Stocks, Bonds, Gold and Government Securities bought and sold on Commission.

JOSEPH MOORE & SONS,

(Established 1820).

MANUFACTURERS OF EVERY DESCRIPTION

INSULATED WIRES

FOR TELEGRAPHIC PURPOSES,

585 & 587 CHINA ST., BELOW GREEN ST.

PHILADELPHIA, PA.

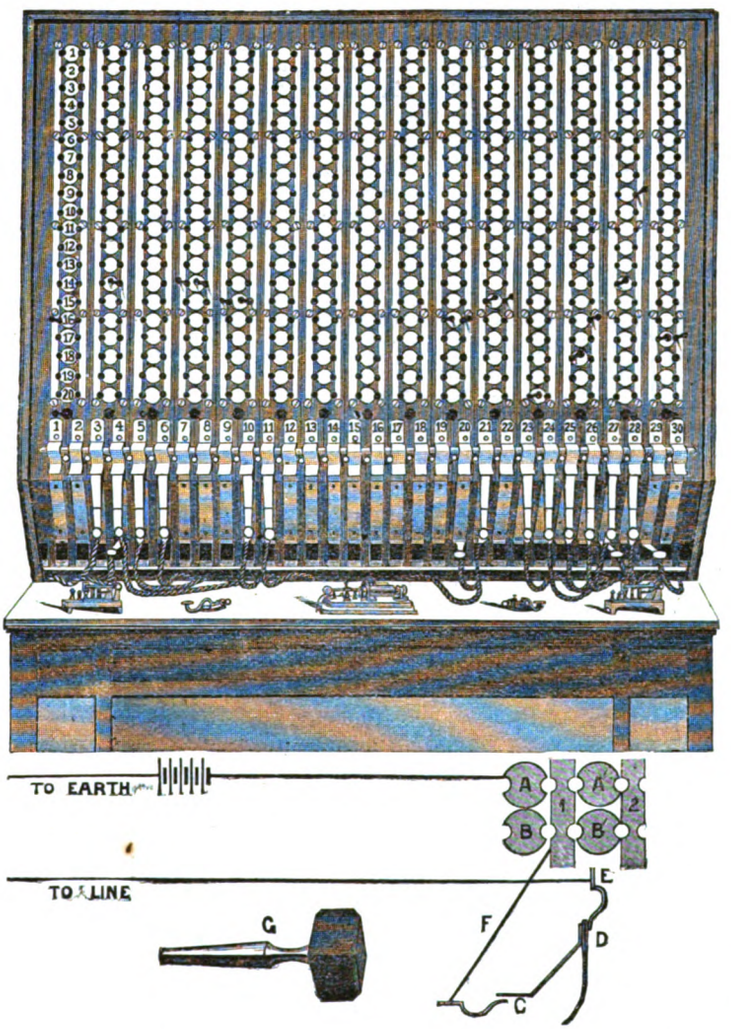
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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 11. NEW YORK, MAY 1, 1872. WHOLE NO. 108.

THE NEW YORK SWITCH BOARD.

The accompanying cut represents a part of one section of the new switch in the New York office. The switch is divided into three sections, intended respectively for the Eastern, Southern and Western circuits. Each section makes provision for accommodating forty-four main wires, or one hundred and thirty-two in all, with any desired number of loops, instruments and batteries. The whole switch is twelve feet in length by three feet in height, and contains sixteen thousand pieces. In each section of the switch there are forty-four vertical metallic strips, to which the main wires are attached. Between each two metallic strips is placed a row of metallic buttons, to which are attached the batteries. On the left hand of the switch board, it will be observed, the buttons are numbered from one to twenty, consecutively. All the buttons on the same horizontal line are connected together at the back of the switch by means of a copper wire. Small circular holes will be seen in the cut on both sides of each button, and in the corresponding portions of the vertical metallic strips. These are designed for connecting the button and the strip together by means of a small metallic peg. Immediately beneath the lower end of the vertical strips are placed a corresponding number of spring-jacks, and beneath these again still another series of spring-jacks. Into the upper series of spring-jacks are inserted wedges, to which are connected wires leading to the instruments, and into the lower series of spring-jacks are inserted wedges to which wires are attached connecting with special batteries. Each spring-jack bears an ivory plate, upon which is engraved the number of the circuit to which it is attached. The vertical metallic strips, buttons and spring-jacks are handsomely nickel-plated.



The diagram beneath the table upon which the switch rests, shows how the connections are made. In this diagram the positive pole of the battery is represented as being connected with the button A, a wire in the rear connecting A with A'. The main line wire is represented in the diagram as connected with E, which is the upper spring-jack referred to. At D, is inserted a wedge connecting by insulated wires with the operating instruments. At C, the lower spring-jack is represented in which is to be inserted, when necessary, the special batteries or loops. The wire F, connects the lower spring-jack with the vertical metallic strip 1, and by inserting the peg G, in the circular orifice between the button A, and the strip 1, the line wire is conneeted through the battery "to earth."

Each section of the switch is built of mahogany, cut in strips two inches wide by one inch thick, and separated from each other by a space of one-eighth of an inch, to prevent injury to the brass work by shrinkage. Each piece of mahogany supports two strips of brass and one row of discs or buttons. The spring-jacks are held in position by stout spiral wire springs attached to the back of the switch.

There are now working from this switch two hundred and one wires, namely:—main wires to the east, twenty-two; to the west, twenty-eight; to the south, thirty-nine; branch wires and loops, one hundred and twelve.

There are connected to the round plates in front the following general batteries: 4 of 45 cells, 1 of 40, 2 of 30, 1 of 28, 2 of 25, 1 of 15 and 1 of 8.

LISBON TO BRAZIL.

A convention has been signed between the Maintenance and Construction Company of Great Britain and the government of Portugal, for the laying of a telegraphic cable from Lisbon, by way of the Madeira and Cape Verde Islands, to Brazil. This is a great undertaking; but the company indicated is a strong one, and will doubtless carry the enterprise expeditiously through. Between Lisbon and the nearest point on the cost of Brazil, Cape St. Roque, by the route designated, the distance is some three thousand five hundred miles, in a southwesterly direction. For the first two thousand miles, by the Madeira, Canary and Cape Verde Islands, the line, a few hundred miles distant, will run parallel with the west coast of Africa. The Cape Verde Islands are within two days by steam from the British settlement of Sierra Leone and our neighboring African republic of Liberia. From Sierra Leone, across the Atlantic to Cape St. Roque, in Brazil, the distance is nearly the same as from the most southerly of the Cape Verde Islands, about fifteen hundred miles. But on the route between these islands and Cape St. Roque are first, the little island of St. Paul, and then, within two hundred miles of said Cape, is the little island of Fernando Noronha; so that, from these convenient stations, *en route*, no single stretch of the cable between Lisbon and Brazil exceeding eight hundred miles will be required.

The advantages offered to the company and to Great Britain and its nation of shop-keepers, from the laying of this cable, are broadly suggested in the immense and constantly increasing trade between Brazil, the Argentine, and other South American States, on the one hand, and England on the other. The facilities which the cable will afford in the timing of exchanges and shipments of goods need not be mentioned. This cable will unquestionably operate to systematize and extend in every direction the commercial exchanges of England with the South American States. And again, this line from the Cape Verde Islands will contribute its advantages to the British establishment at Sierra Leone, and to its railway intended to capture the great interior trade of Timbuctoo, and to the various other English commercial enterprises afoot in equatorial Africa. Nay, the conveniences of this cable will be felt at the Cape of Good Hope, and will thence extend to the new and prosperous British colony of the African diamond fields.

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The advantages suggested to the United States from this cable are of a secondary character; but still we shall not be loosers by it unless our commercial people choose to lag behind hereafter as they have done heretofore in the competition for the illimitable traffic of South America. States.—*N. Y. Herald.*

THE NEW YORK FIRE ALARM TELEGRAPH.

A visitor to the central office in Mercer street is surprised at the amount of delicate and costly machinery which is crowded into the small room devoted to the use of the telegraph. Three sides of the apartment are completely filled with the apparatus—some of it so intricate that it must be kept covered with glass, to exclude the least dust or grit, which would at once interfere with its movements. At the end of the room facing the entrance may be seen the wires, which enter here from all parts of the city to the number of nearly two hundred, each with its little brass key with which it is thrown "into circuit." To the right of this frame of wires stands a large "annunciator," similar to that used in hotels; this is surmounted by a Morse magnet and a small gong. Below and in front of the annunciator is a printing machine, and on each side of this is a "dial machine" and pointer, similar to those used in the station houses. On the opposite side of the room a very beautiful piece of mechanism stands on a table, covered with glass and always ready for use. At the first glance, one would say it was a rather complicated musical box or a small barrel organ; for it has six drums with the stops and steel combs, and its operation is somewhat similar. To this instrument is entrusted the work of conveying an alarm to every engine house from the Battery to Harlem, which it does with "neatness and dispatch."

To illustrate, let us suppose that an alarm is struck on the gong. The number rung is 256; instantly the annunciator uncovers this number, and the printing machine writes it down three times and the gong repeats it twice. The wires are thrown at once into "circuit" by an operator, while another places a brass button bearing the same number on the spindle of the machine in the glass case, touches a spring, and off starts the automaton operator, striking 2—5—6 on every fire-gong in the city, making a pause of five seconds, and then repeating the 2—5—6, and yet again repeating the numbers after a similar pause. While this is going on, the same operator throws the wires to the bell towers into circuit, and the alarm is thrice sent to them; and, in less time than it takes to read the description, the bells are heard, and if the fire is near the office, the engines rattle by.

The next step is to make a record of what apparatus is at the fire, which is done by pulling out, from their receptacles in a neat frame, cards bearing the numbers of the engines and trucks which respond to a first alarm. This is scarcely done before 3—3—3 is rung on the gong. This is a private signal, sent from some box by a fireman, policeman, or perhaps one of the commissioners who has not heard the alarm distinctly and wants to know where the fire is. The number of the box whence the alarm came (2—5—6) is at once sent to the box designated by the annunciator, where it is rung on a little bell. Occasionally this inquiry comes from half a dozen boxes.

By this time, the bells in the office have ceased their twinkling, the automaton has given its alarm, the record of engines out is made, and the operators sit down to compare notes as to what bulidings are in the neighborhood of the box giving the alarm, and the probabilities of a large fire. But any apprehensions are allayed very soon by the signal 2—2—2—6, announcing that engine No. 6 has returned home from the scene of the fire, proving that it was either a trivial affair or a false alarm. No. 6 is returned to its place in the register showing that the district is no longer unprotected. The other engines announce their return in a similar way. In a few minutes after the last one has returned, a report of the property burned, the cause of the fire and the probable loss is received from the police station in the district, all of which is registered.

At some time during the night, or perhaps two or three times, the roll is called, to ascertain if the tower men are at their posts and awake. This is done by throwing all the tower wires into circuit, and giving the private signal, which is responded to by the watchers striking the numbers of their respective towers on the gong in the office. As an instance of how acute the sence of hearing becomes by constant training, it may be mentioned that an operator can almost certainly tell by the manner in which the numbers are struck whether the reply comes from the proper tower, or another watcher is answering. For instance, if tower No. 6 answers for itself, and then attempts to answer for No. 9, the difference in the manipulation for the longer signal will be detected by the operator at headquarters. In this case, or should no reply be received, a messenger is despatched to find out why the tower is without its occupant.

Of course, where instant action is required, it is necessary that the circuits be complete, the batteries all in working order, and the machinery without fault. To secure this, the aid of music is very ingeniously obtained. A number of magnetic coils are attached to the hammers of a harmonicon, and they with the plates of the instrument, form the opposite poles. To prove that everything is in proper order this harmonicon is thrown into connection with the other machinery, and if everything is right a complete octave from C to C is performed. Should anything be out of order one or more notes will be dropped, and the missing tone indicates where to look for the trouble.

Like all other telegraph lines, accidents will happen to the wires occasionally, and here another very ingenious contrivance is brought into use. Should there be any break in the line running up Third avenue, for instance, instead of sending a man to examine the wire from the central office to Harlem and back again, the circuit is made complete, a little instrument attached, and a current sent through the line, which travels until it meets the break, where, of course, it stops; and this point is indicated so exactly that the operator can tell almost the particular block in which the repairers must look for the trouble.—*New York Evening Post.*

INDIA-RUBBER INSULATED WIRE.

Any facts that may at times present themselves as bearing upon the duration of india-rubber or any other insulator must be a matter of some importance to telegraphy, and, being considered in that light, should be brought as much as possible before the telegraphic world, so that some advantage might be derived from the result of such facts.

Proof is every day obtainable of the lasting properties of gutta-percha insulated wire, especially in salt water, where it would appear to be imperishable. On land however, such favorable results have not been obtained, although it cannot be doubted but that gutta-percha, properly prepared, might last on land, or underground, as long as it could be desired. With india-rubber, however, we have not had such experience, principally for the reason that it has not been used much until latterly for the purposes of cables. The manner in which wires were insulated with this material was either with "pure" rubber or with "vulcanized" rubber. The former is the plan originally adopted, the latter the plan now in use. The "vulcanized" rubber-covered wire has been used for some long lengths of cable during the last five years, but this date is too recent for the purpose of the question of durability. The vulcanized rubber used has generally been that known as "Hooper's material."

However, if we go back to a period of just twenty years, we shall find that a four-wire cable, insulated with pure rubber, was manufactured, and any experience of the present state of that cable must be of interest. Therefore, having lately seen and inspected a specimen of that cable, we place before our readers the result of that inspection, and the history of the cable itself.

In the early part of 1852, Mr. C. West manufactured 2¾ miles of cables, consisting of four wires. Each wire was of solid copper, insulated by three lappings of strips of pure india-rubber of a narrow width; the four wires were laid up helically together round a core of yarn, and were then lapped over with one stout piece of yarn, well tarred; the whole was protected with a sheathing of plaited iron wires. During the summer and autumn of 1852, this cable (2¾ miles) remained coiled up in a yard, exposed to every vicissitude of the weather, the alternation of wet and dry, sun and shade. A cable could not be situated in a worse place. It was eventually submerged or buried in the early part of 1853, between Keyhaven, on the Hampshire coast, and Hurst Castle, and a piece was laid also across the Yarmouth River. The specimen examined was taken from the Hurst Castle section, where it had been buried in thick mud, covered by the sea from half flood to half ebb. The mud in this place is always moist, and but little change is effected in it by the flow of the water over it. The insulated wire may therefore be considered to have been placed in a very favorable situation.

The specimen examined was cut out near Hurst Castle, at the end of January, 1872; it had, therefore, exactly an age of twenty years.

The appearance of the cable was as follows:—The iron sheathing was oxydized, but offering still a very strong protection; on removing the sheathing, the yarn was found to be perfect, with a large quantity of tar remaining in it. The strength and goodness of the yarn was quite as excellent as it ever had been. The insulated wires had been considerably indented by the yarn, and discolored by the tar, but to all external appearance remained sound, these portions abutting against similar material, rubber against rubber, were, on being opened, in perfect preservation, and of a color apparently unchanged.

The insulation of the short lengths appeared good, for on being placed in water, and a current from 100 cells being passed into the wire, about one division was all that could be obtained on a delicate Thomson's reflecting galvanometer; on testing them, however, for retention of an electrical charge, it was found that their insulation was inferior, none of the wires were able to hold a charge for any lengthened period.

This result was not surprising, for, with the manufacture of such a cable at the date referred to, the insulation to be obtained, and the means of measuring it, were very different to what they are at the present time. Although the insulation of these wires at the present date is inferior, yet we may safely assume that it has not deteriorated since the date of manufacture.

A wire insulated in such a manner, with one strip of material placed over another, and so on, cannot be expected to give perfect insulation, for it would be impossible to make material so placed perfectly homogeneous. The means of testing at that date were necessarily, from the state of our limited knowledge and experience, very crude and imperfect, and doubtless, at that time, with a large amount of battery power and the best galvanometer then obtainable, the insulation was considered perfect.

On cutting and examining the wires, it was found that there was a fair adhesion between the several lappings, and the material of each lapping had the true color of freshly-cut india-rubber, retaining, at the same time, its elasticity. This may be considered as one of the principal tests of the material after a lapse of years. India-rubber as it gets old frequently dries and gets short, that is, loses all its elasticity, and may then be considered as good for little or nothing. In the present case, all the characteristics of good rubber were apparent, and its

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state may be said to have remained unchanged during the long time it was lying in the Hampshire mud.

The long time this cable has lasted in such perfect preservation is doubtless due to the excellent material of which it was manufactured. At that time the largest quantity of rubber imported was that known as Para, the very best kind, which has remained at the head of the list ever since its introduction. With this pure material the wires of this old cable had been covered. Since that time rubber from various parts of the world, and of various qualities, has been largely imported, and the quality of the material now used is undoubtedly inferior to that of the pure Para. The want of success attending india-rubber covered wire on land lines may owe some portion of its failure to this reason.

The stripping of the final lapping of rubber showed the copper wire perfectly clean, and with a bloom on it apparently as if it had just been manufactured. Copper wire has generally been considered dangerous to be in contact with india-rubber, and all copper wire now manufactured is invariably tinned before being covered with rubber. We believe this to be a necessary precaution when vulcanized or other than pure rubber is used, but when the rubber is pure the copper appears to be harmless.

A good many faults in india-rubber covered wires have been ascribed to the action of the copper, for it has been generally found that in the old wire the copper was always oxydized whenever the rubber had failed, or had got soft and sticky. It would appear as if the saddle had been placed upon the wrong horse, and that the oxydation of the copper was due to the failure of the india-rubber, and not the reverse, and that therefore the extra cost of tinning copper wire before covering it with pure rubber has been a useless expense. It still goes on, although one would have imagined that the appearance of the self-same kind of faults, even with the use of tinned wire, would have shown its inutility.

To tin copper wire before covering it with pure rubber we cannot but consider as a useless expense, but it is doubtless necessary when impure or vulcanized rubber is used.

It must not be imagined that the whole of the cable we have been referring to has lasted so well, or remains in such perfect condition, as the piece which has been examined with such interesting results. During the long time the cable has been laid, many faults have appeared, and in many cases the india-rubber has become soft and sticky in its common manner; but it must be remembered that these faults have always shown themselves when the wire has been exposed in dry places, in places above ground, and at wind and water marks. In such places india-rubber has usually failed. The instance we have adduced is one in which its preservation is noticed when kept moist and deprived of light. This is, we believe, one of the best instances known of the preservation and duration of a wire insulated with india-rubber.—*Engineering.*

ELECTRO-MOTIVE FORCE OF DIFFERENT METALS.

(Abstract of a paper communicated by M. Edlund to the Academy of Sciences, Stockholm. Translated by C. W. Vincent).

In 1869, M. Edlund had demonstrated the following facts: Whenever an electric current traverses an electrometer in the direction of the current developed by that electrometer, the latter absorbs an amount of heat, proportionate to its electromotive force multiplied by the intensity of the current; and if the current is sent in the opposite direction, there is a quantity of heat evolved proportionate to the same product. With a current constant in intensity, the amounts of heat absorbed or disengaged are simply proportionate to the electro-motive forces.

If a voltaic current is sent through a wire made of two different metals, a change of temperature at the point of contact should be observed, because it is the seat of an electro-motive force; the temperature should be lowered if the current is in the same direction as that which corresponds with the electro-motive force, and it should be elevated in the opposite case.

Now experiment has shown that the temperature is raised and lowered at such a junction of different metals when a voltaic current passes through it, and that the change of temperature is proportional to the intensity of the current and to the electro-motive force.

It will be sufficient, then, to measure the amount of heat absorbed or evolved during the passage of the current, to obtain the valuation of the electro-motive forces which are manifested at the junction of two different metals.

This is the method which M. Edlund has employed in a series of experiments, in which he was assisted by M. Sundell, and of which the results have been submitted to the Academy of Stockholm.

The following numbers express the relative values of the electro-motive forces of the under-mentioned metals estimated in this way:—

Bismuth-copper, ...	141·3
Platinum-copper, ...	7·4
Copper-iron, ...	17·8

Zinc and silver approach so nearly to copper, that it cannot be distinguished if these metals should be placed before or after copper in the series of electro-motors.

The thermo-electric effects of the same metals were subsequently determined by direct experiments. Below is the result of some of these, calculated for a difference of temperature of 10 degress, and at a conductibility equal to 100. The second column of the table contains the electro-motive forces, as determined by the first method, and multiplied by a constant factor, so that the copper-iron combination has the same value as in the first column—

Combinations.	*Thermo-Electric Series.*	*Electro-Motive Series.*
Bismuth-copper, . . .	92·3 .	197 6
Platinnm-copper, . .	8·2 .	10·3
Zinc-copper, ...	0·9 .	0·8?
Silver-copper, . . .	0·6 .	0·0?
Copper-iron, ...	24·9 .	24·9

It is seen that the respective order of the metals is the same in the electro-motive, and in the thermo-electric series, although the contact forces are far from being proportionate in the two series. On the contrary, the series of electro-tensions, as it has been established by electroscope experiments, is very different. According to Seebeck, the metals are ranged in the following order, each one being electro-negative to that which follows it: silver, platinum, copper, iron, bismuth and zinc.

Other experiments have made this order slightly different, but with no greater approximation to the electro-motive series. It is probable that the electric tension does not depend solely on the contact of the metals, but also on the gas or liquids condensed at the surfaces of contact.

M. Edlund remarks, in addition, that, if the modifications which the electro-motive forces of contact should undergo, when the temperature is augmented, are calculated by the aid of the mechanical theory of heat, results are obtained which actual experiments do not confirm.

REGULATING THE TARIFF.

BUFFALO, Jan. 11th, 1872.

To the Editor of the Journal of the Telegraph:

Your correspondent on the subject of tariffs, in his letter to the JOURNAL of Jan'y 1st, stated that he has "A plan of tariff, &c.," which he will send, if desired, and in your remarks upon his letter, you gave a somewhat general invitation, saying that what was wanted is a plan which will promise success, not predictions of failure. I therefore take the liberty of considering myself one of the invited, and submit the enclosed plan in response to the "invite."

Without claiming that I have been the first to discover the plan, I will say, that I have given some thought to the subject, and have computed the distances, with a view to having the charges in proportion to the distance a message is to be transmitted, and have the system a just and liberal one, to the company, as well as to the public generally. My idea is to have each office the centre of a series of circles; first, a radius of 50 miles or less, for which a tariff rate of 25 and 1 is charged; second, circle of 100 miles or less, 35 and 2; third, 250 miles, 50 and 3; fourth, 500 miles or less, 75 and 5; fifth, 1000 miles, 100 and 6; sixth, 2000 miles, 300 and 20; seventh, 3000 miles, (or the distance from ocean to ocean,) 600 and 40. These distances, as well as the rates charged, can be increased or lessened, as the tariff bureau may see fit. Each office is to have a common map of the United States, in place of a tariff book. The circles are of course, stamped on the map, "for instance, for N. Y. office, New York will be the centre; for Chicago, Chicago will be the centre, and so on." My intention with the enclosed map, is to merely show the principle on which the plan is supposed to work.

This idea, or a similar one, may have been thought of and discarded as impracticable by the tariffites, in which case I shall have had "my trouble for my pains."

Yours,

TARIFF.

Note.—This is precisely the plan of our correspondent, * * * and is the old Russian plan, which on general principles of simplicity and justice, is, with a country bearing in all its parts like conditions, the simplest and best ever adopted. The state tariff, if it could be freed from exceptions, is, we believe, the best for America.

ELECTRIC PROBE FOR WOUNDS.

In the last general assembly of the Scientific Association of France, M. Trouvé exhibited and described his probe for the search and extraction of foreign bodies remaining in wounds. Surgeons have at all times been occupied with the discovery of a simple and practical means, capable of revealing to them to a certainty, the presence of any foreign body in the tissues. Since Garibaldi's wound, two plans have been proposed, the one frictional and the other electrical. That by friction (Dr. Nélaton's plan) was preferred to the employment of electricity, proprosed by M. Favre, of Marseilles, which was the subject of a communication to the Academy of Sciences. The style of probe which Dr. Nélaton uses to discover the presence of a ball has at its extremity a small "rugous" or wrinkled porcelain ball, which becomes blackened in contact with a leaden bullet. This plan is, without doubt, ingeneous, and in this special case of great utility; but the services which it can render are very limited. In fact the body, the presence of which it is sought to verify, must be of lead, and the wound should not be closed very straight, nor even very curved. This verification becomes even impossible when, as frequently happens, the bullet is encysted or covered with a portion of muscle or cartilage, or even with a fragment of the clothing of the wounded person.

The apparatus of M. Trouvé consists of three distinct parts: a battery, a probe, and an indicator (*révélateur*). In principle, it is founded on the difference in conductibility between metals and other bodies. The battery is formed of a zinc and carbon element, enclosed in a case of hardened India rubber hermetically sealed, the exciting liquid being bisulphide of mercury. The probe is a pipe, flexible or rigid, constructed so that the preliminary probing may be effected, and then the stylets of the indicating apparatus may be introduced. The indicator contains in its interior a very small electro-magnet with a vibrator and two small rods of steel, very sharp and insulated from each other; and as soon as these points, which are in connection with the battery touch any metallic substance, the vibrator begins to move.

With this apparatus, it is possible to distinguish the different metals from one another. If the metal is lead, the trembler vibrates regularly; if, however, it is iron or copper, the trembler has a jerky movement.

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RAILROAD ROAD WIRES.

To the Editor of the Journal of the Telegraph:

Since my article entitled "Railroad Wires, their Uses and their Abuses," appeared in your issue of December 15th, I unfortunately had not seen a number of the JOURNAL until a few days ago, and was not aware it had called out other expressions of opinion on the subject of train orders. In looking over the Journals for February, I see quite an interest has been awakened, and am glad to notice that some of the writers have clear views on the subject. "Western Dispatcher" in the JOURNAL of February 15th, explains very intelligibly, the system of which I spoke, and shows its advantages over other systems aside from its economy in the use of the line. His points are strong ones, and should be read carefully by all Train Dispatchers. "Another Observer" in JOURNAL, No. 102, seems to think it might do occasionally to send an order to both trains at one time, but that it would not answer in every case. This is only a mistaken idea—there never was an order given but that properly worded could not go to both trains in exactly the same form. The custom of making train orders, read to "Conductor and Engineer," and having both their signatures repeated, and then correct it thus: "To Conductor and Engineer, O. K" —is another slight abuse of circuit. It is right that the engineman of a train should have a copy of the order, and be held personally responsible for any accident that may happen from his misunderstanding of it; but it isn't at all necessary that the order should be addressed to him and come back with his signature—it is only a waste of time. Let there be a rule on the time card compelling enginemen to have a copy of the order in their possession, and making the violation of this rule a cause for dismissal. There is much more that might be said on the subject of train orders; that there should be a uniform system adopted by our Railroads for moving trains by telegraph, and also, that there should be a uniform code of signals agreed upon would seem to need no argument. The chances for accidents would be lessened, insuring greater personal safety to travelers, and to the corporations a decrease in losses of rolling stock, &c.

OBSERVER.

MOBERLY, March, 18th, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—Some time ago, mention was made in the JOURNAL of an "Automatic" telegraph, or device for transmitting and registering telegrams automatically. I have a good deal of curiosity to know whether it is a resurection of the old devices of Morse, Bain and others, or if it does really contain anything new. Will you be good enough to enlighten me on the subject, also, if the thing still lives, or has "gone where the woodbine, &c."

Yours, respectfully,

D. H. FITCH.

It is the same cat with a new collar. The question of existence is in debate. There seems just breath enough to prevent a funeral.

RED MESSAGES.

ORRVILLE, O., March 27, 1872.

To the Editor of the Journal of the Telegraph:

I am pleased to see that "S," of Cleveland, has let out on the present mode adopted by most offices in transmitting half rate messages.

When the order for receiving "red" messages was promulgated, I interpreted it as being the idea of the Company to create a system by which the lines would be brought into greater use during the night, *after* the business of the day has been cleared up, but at present the setting of the sun seems to be the signal for rushing in the "red" messages, and in many cases, in contention with, and to the delay of, the unfinished business of the day. In this way the bulk of the half rate business is crowded in during the early hours of the evening, largely on the time of the day men, leaving the lines unoccupied later in the night.

Why not fix upon a certain hour, say ten o'clock, before which time no "red" business is to be transmitted? Offices where no night operator is employed might be permitted to commence on half rate business at eight o'clock, but not make it general to all until nine or ten P. M.

Yours, &c.,

EQUALIZER.

LIGHTNING PROTECTORS.

CLEVES, OHIO, March 27, 1872.

To the Editor of the Journal of the Telegraph:

Referring to the article on lightning rods in the last number of the JOURNAL, I give you my experience with them:

I have for several years had charge of repairs of the I. C. & L. R. R. wires. In 1866 three different sections of our line were particularly troubled with lightning. Hardly a storm passed but one or more poles would be shattered. While my poles were being struck so frequently, I was struck, (not with lightning,) but with this idea of rods from top of pole to the earth. I did not see how it could affect the main circuit and thought it might save my poles, where my interest lay. Accordingly, without the knowledge of my Superintendent, I put on the lightning rods in the troubled sections. They are there to this day and have been a complete success.

Last Summer we had trouble in the same way near Lafayette, an application of lightning rods there had the desired effect. I also put the rods on the first three poles each side of the Superintendent's office at his residence, and he was not troubled during our worst storms.

From this I believe it would be well at river crossings to put rods on the first eight or ten poles next to the cables.

RICHARD C. RUSSELL.

OPERATORS AND THE TARIFF.

To the Editor of the Journal of the Telegraph:

Every number of the JOURNAL of late has been of much practical interest. When operators begin to show their lack of knowledge, and ask for light, for instruction, we may justly hope that a better day is dawning among us.

In the issue for April 1st "Old Man," in referring to wages paid, and the competency of operators, touches a subject which has been too much neglected. Given competent operators on all our lines and the vast amount of check errors, which now seem unavoidable, would be a thing unknown. At present, however, at least three out of every five are not qualified in respect to a knowledge of the English language; and very few understand the rules as printed. As to counting words, here is a specimen:—"I start for St. Paul to-night, arrive there to-morrow, from thence by Rock Island, Council Bluffs and Kansas City to St. Louis"—checked 24, Paid—each name and compound word being counted as two words. In another case, in answer to a message asking how much sugar the person had on hand, the reply was: "I have one hogshead," the sapient operator insisted on making "hogshead" two words.

I differ with all who have gone before on the matter of the present tariff system. It is an admirable arrangement; the great trouble being that operators will not pay attention to entering up the names of new offices as fast as received. The only trouble with the tariff book is, its being so deficient in space for the entering of new names; and especially so under particular letters. In the Supplement this should have been attended to, but was not. Should another book be issued, this point should be carefully arranged. I have had to make an extra book for some letters.

Not far from me is an office which has not entered up a new office during the last six months. Some offices pay no attention to the rule in regard to offices near them within 25, 50 and 75 miles, but go by squares in all cases. I do not like the newly devised system by States; believe it would not be understood but by few, and therefore cause much confusion.

TELEGRAPHER.

ASSUMPTION, ILL., March 27th, '72.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—I notice lately a communication in JOURNAL from some very liberal Manager, advising the W. U. Telegraph Co. to revise and re-issue the Tariff book quarterly; that he would be willing to pay, etc., rather than be continually scratching out and entering changes as they occur. Now I verily believe the W. U. Co. able to furnish tariff books to her office managers free of charge. My tariff book is very much mutilated, as I presume most others are, and would be pleased to be presented with a new one complete to date. If the Company contemplate issuing a new book I would make the following suggestions: That it leave no space for entering names of new offices, but that there be a space about $\frac{5}{8}$ inch at the left of each page for entering in small figures (red Ink) the number of JOURNAL on same line with any office, whose Tariff, Name, Co. or P. O. address has been changed since issuing of previous JOURNAL, and that the JOURNAL leave space at left of new office column for same purpose, and that it be an imperative duty of all managers to preserve in perfect order each file of the JOURNAL. Also that each office be furnished one of Emerson's Self-Binders for the purpose, making a perfect book of them, that the JOURNAL, instead of issuing the change of name of an office as at present, note it in alphabetical list: example, "318 Arcola, Ill., heretofore Okaw, Ill."

Am inclined to the opinion if the above suggestions were carried out there would be no need of a new issue of Tarif book for next ten years, even if the Government should act so wisely as to keep her fingers out of the Telegraph business. Permit me to say also that I think it the duty of every knight of the quill, every lover of political economy, every one who desires our present enormous taxes reduced instead of increased, who are opposed to Government putting her procrastinating heel upon private enterprise, diving headlong into an enterprise which will be detrimental to *tens of thousands*, and beneficial to comparatively but few, should write, say, and do every thing honorable in opposition to the Postal Telegraph Movement.

W. W.

NEW YORK, April 4, 1872.

To the Editor of the Journal of the Telegraph.

Sir:—What is the "invention which bids fair to double the capacity of existing wires," vaguely hinted at in your editorial of this week? Or is it a secret?

Yours,

AN OUTSIDER:

ANSWER:—We referred to the plans of Mr. Stearns in so arranging machinery and currents as to enable a single wire to do the work of two. By a peculiar arrangement, which we are not at liberty yet fully to describe, messages can be sent by the same wire, both ways, at the same time, without interfering with each other. It is a noteworthy achievement.

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MORE TRAIN ORDERS.

EASTERN DIVISION PITTSBURGH, FT. WAYNE AND CHICAGO RAILWAY.
April 11, 1872.

To the Editor of the Journal of the Telegraph :

I have read the various learned opinions in the controversy between the advocates of their respective systems of train orders with considerable interest, and believe that a little experience meeting is beneficial amongst telegraphers as well as others.

In speaking my little piece, I desire to differ *from* the "Old Man" whose fifteen years experience has taught him that in an order for trains No. 1 and 2 to meet at A, that the conductor of No. 2 can fall back on his dignity, or schedule rather, and refuse to proceed until he has received a *positive* order giving him the right of road against No. 1. Methinks I hear an audible smile amongst the old stagers. When the dispatcher says to two trains they should meet at A, can anything be more positive that he intends them to meet at that point, and that each has an equal right to proceed to A, and for neither to pass that point until the other has arrived, regardless of anything the schedule may say? If not, why have the despatcher at all if a plain order like that is counteracted by the schedule?

Probably no road in the Union makes better use of the telegraph in the moving of delayed trains than the Pittsburgh, Ft. Wayne and Chicago, as the trains are numerous, and it requires close figuring to get a delayed train through without detaining others. The system adopted I think would serve as model for all.

When the dispatcher wishes to give orders to trains, he calls up both the offices wanted, and sends the same to each at one writing. All orders are copied on manifold paper by which as many as are required are made at one writing, and all exactly alike. These orders are then signed by the conductors and repeated back. With the dispatchers O. K. the exact time from the regulator is given by which conductors and operators can note any variation of their time-pieces. All orders are numbered by the dispatcher, thus in repeating or referring to at any time the order meant is readily designated by the number. Two copies of each order are given to each conductor (one for the engineer.) As the freight trains frequently run in sections of two, four or more, the dispatcher always notifies the operators how many copies to make. For convenience, the manifold paper is prepared in packages and marked 3, 5, 7, &c., as the case may be, so that the operator can, on the instant, be ready to copy as many as the dispatcher may request.

The form of the orders is generally of a simple nature, as follows: "To conductor No. 1, A; conductor No. 2, C; Nos. 1 and 2 will meet and pass at B," or No. 11 has until 3.45 P. M. to run to B ahead of No. 1," or No. 2 will run to B regardless No. 1," or "No. 5 can use 10 minutes on time of No. 7 to run from A. to B." This system, with the manifold paper, requires less time and is safer than any other I have ever came across. With the manifold paper properly prepared, an operator can copy four or five different orders, and can be ready to repeat them back as fast as the dispatcher wishes to send them. Collisions and kindred unpleasant things are ruled out on this system. SCAT.

ANOTHER VOICE ON TRAIN ORDERS.

TRENTON, Mo., April 11th, 1872.

To the Editor of the Journal of the Telegraph :

A great deal has been said on the subject of train orders through the JOURNAL. "Old Man" offers some very good suggestions in your last issue in regard to employing competent operators on railroads, which, of course, can never be had at salaries paid by a great many roads at the present time; but his ideas of train dispatching seem to me to be rather old. Of course no train dispatcher, who understands his business, will give a train an order to proceed against another train having the right of track, without first giving the order to the latter, or placing an order ahead of it to hold it for orders. In the order he quotes: To conductors and engineers, Nos. 1 and 2. "Trains Nos. 1 and 2 will meet at A." I have always regarded an order of this kind a positive order for both trains to run to the designated point, regardless of each other—irrespective of time and schedule rights. By substituting the following: "To conductors and engineers, Nos. 1 and 2—No 2 runs to A, regardless of No. 1." This, of course, would give No. 1, the train having right of track, the stipulated schedule time to make A.

On the subject of duplicating train orders, it is my opinion that at the present stage of railroading it cannot be worked with success. Where, as it is most generally the case, a large number of operators are also station agents and have other duties to attend in and out of the office, it would consume more time in the end than the old system of sending each order separately. It would be, perhaps, seldom both offices could be made to respond just at the same time. However, I consider the plan a good one; but, until reliable operators are placed at every station, with no additional duties to perform, it cannot be worked to advantage. With a good schedule of rules, and train men who understand them thoroughly, I think the shortest form of train orders, which will embrace what is required and be understood by all, sent to each train concerned separately, is the safest and the best. Yours very truly,

A VOICE IN THE WILDERNESS.

PACKING MESSAGES.

The business of "packing messages" has grown to great and inconvenient proportions in London, and was discussed at the telegraph conference recently held at Rome, but no method was devised whereby it might be stopped. "Message packers" are persons who defraud telegraph companies of part of their charges in various ways, but generally by reversing a message and making it appear as a cypher. For instance, the charge for sending a message to India is ninety shillings for twenty words, including the address, and a firm in London agrees to forward messages for ten shillings a word, and as it has its agents in Calcutta who understand its cypher several messages may be sent by the use of twenty words; if ten messages are thus sent ten pounds are paid for them to the firm, which receives therefor ten pounds from its customers, and of course pockets five and a half pounds. Another method of "packing" is to reverse a sentence, send it as one word, and—if the words be short, in which case only this plan is feasible—something will be made by the operator, since in ordinary messages five letters are allowed for each word. It may possibly be true that similar means of sending messages cheaply are adopted in this country, but as yet no firm has been heard from which makes a business of such action.

THE "Wonders of Electricity" is an interesting volume, and our correspondent, P. J. Huder, Algiers, La., can find it in any good book store in New Orleans. It is published by Scribner, New York.

MR. K. S. V. RANDOLPH has determined to open a school of Telegraphy in New York, where every branch of the business in all its details will be taught.

ROCKPORT, IND., April 18th, 1872.

To the Editor of the Journal of the Telegraph :

DEAR SIR,—A lady came in my office and sent a message. In about an hour after she had gone her husband came in and sent a message to same person and with same contents the former had sent. Was it my duty to have told him that that message had been sent, without his asking me? By answering the above in your next issue you will greatly oblige

OPERATOR.

Answer.—Your duty was to take, in silence, both messages. A receiver is presumed to know nothing of the contents of any message.

EATON, O., April 10th, 1872.

To the Editor of the Journal of the Telegraph :

DEAR SIR,—Please give opinion as to rule 24, which says, "Messages must be sent as written." Does it include misspelled words? I have noticed quite a difference of opinion among operators in regard to the matter of spelling; for example, I had a message sent to my office, a few days since, with the word "sugar" spelled with two "g's." Receiving operator refused to take it unless I would spell it correctly. Yesterday I received (from a large city office) a message containing the word "write" spelled without the "w"—*rite*. Would it not be well, when we can, to call the attention of the writer to any improper spelling? But where we haven't an opportunity of seeing the sender of a message, is it not equally well to send the message as written? We can't tell but what sender may convey quite a different meaning to receiver by misspelling some of his words. Has a receiving operator any right to object to a message because improperly spelled?

Yours truly,

S. S. DIX, Manager.

Answer.—The subject above is one which appeals to the intelligence of a manager. Follow copy is the only safe rule. No other directions can be given. Corrections can only and should always be made in the presence of the sending party.

To the Editor of the Journal of the Telegraph :

Here is a nice question on which I should like your opinion :—

A customer of ours doing a large business to Baltimore, frequently leaves out the place of destination on his telegrams, and in his hurry rushes off; but we in the office, being so familiar with the firm to whom message is directed, and knowing the writer also, forward it on. Now in case of any trouble for non-delivery or delay, or other matters of like nature in which the Company is threatened with a law suit, is his ommission of the place of destination not in our favor? Yours, &c.,

JERSEY.

ANSWER:—The sending it at all, would seem to destroy the whole argument our correspondent suggests. An unaddressed telegram is no telegram at all. The court might so hold it, and the carelessness of the one be allowed to offset that of the other. We do not know.

Houston & Great Northern.

This railroad, which has reached the Trinity, will be extended eight miles north of that stream to a station called Trinity as soon as the bridge over the Trinity is completed, which will be within two or three weeks, the road-bed being ready and the iron on hand. The branch to Huntsville will be completed about the same time.

Elizabethtown & Paducah.

A correspondent inform us that work on this road is progressing most satisfactorily.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JAMES D. REID, Editor,
Executive Rooms, Western Union Tel. Co.,
145 Broadway, New York.

NEW YORK, MAY 1, 1872.

GOOD BYE.

On this bright May morning, on which the whole blooming earth is smiling to the sun, we stand on the door-step of our old home to say adieu. Let no one blame us if there is a tremble on the lip while we utter it. Twenty-seven years have not passed without a love springing up for a grand business which we aided to nurse. We drew up the first code of rules for the management of telegraph lines. We opened, or aided in opening, the first commercial telegraph office. We were the first elected superintendent of a commercial company. We were the first to use iron wire in America. A good many things now in use we might claim a hand in bearing. We entered into telegraphic life with a whole heart, and gave it all our life. Such bonds cannot be broken without emotion. It would be harder but for the ripening. Yet we cannot shut the door on which our hand fondly lingers, or look into the faces of so many of you whom we have loved and labored with so long without feeling the bitterness of a parting hour.

In reference to our own now ended work we have little to say. Our sphere latterly therein has, perhaps, been deemed a little one, yet we have done therein what we could. We have never pretended the possession of extraordinary knowledge, or any special facility of composition, and so we have, at least, broken no promise and have excited no false expectations. We have endeavored to do the duty assigned to us with a simple desire to make a small service fruitful of good, and to infuse into whatever we wrote an element of kindness which might beget itself in others. This we deemed a worthy ambition. Some have assured us of success in this design, and it gives us pleasure to know that we have passed through so many years without knowingly hurting the feelings of the humblest of all who have served with us in the widening ranks of this great service.

In retiring from our duties as Editor of the JOURNAL OF THE TELEGRAPH, we have great pleasure in saying that its direction hereafter will be in hands fully as competent, and with an experience perhaps more practical than our own.

Mr. Fred. J. Grace, well known to the fraternity, has been appointed to the Editorship of the JOURNAL, and with the issue of May 15th, his work in that connection will begin. We think we can promise all a healthy, dignified, practical management which will sensibly increase the usefulness and attractiveness of the JOURNAL.

The JOURNAL with its present volume seems just entering a career of genuine usefulness. The discussion, for example, about train orders has brought out a correspondence which has already attracted the attention of railroad managers, and will lead to investigations of the details and possibilities of telegraphic railroad direction. Already a convention is asked to consult on this very subject. Now let the JOURNAL be so used as that it shall bear the best thoughts of our best and most practical men, as well as of humbler men who yet look with intelligent eyes upon the responsibilities they have assumed. The new Editor, Mr. Grace, has that practical talent which will enable him to set all these suggestions in their best light, and render all such discussions full of promise of positive good. So now we have only space to say to you all, and we say it very kindly, very tenderly, and indeed, very sadly, farewell.

JAMES D. REID.

As an evidence of the value of Mr. Stearn's machinery for the transmission of messages both ways over the same wire at the same time, we give the following from the manager of the New York office.

On April 10th, between New York and Boston, the following operators were placed on duty, in connection with a single number nine wire to be worked with Stearn's machinery.

Messrs. Catlin and Dwight, New York.

Messrs. Beardsley and Stewart, Boston.

Catlin sent to Beardsley in one hour, from New York to Boston, messages	72
Stewart, Boston, sent to Dwight, New York, in same time	64
Total by one wire in one hour	136

The messages were not selected, but were the regular business of the office, many of the messages being long ones, ranging from ninety-one words down. No office messages were included; all were regular numbered messages. The actual time consumed was fifty-eight minutes, two minutes having been lost by interruption.

Here is a vast advantage gained. No automatic plan approaches it in positive value. It is the most marked advance yet made in telegraphic service, for though it does not quicken the process of transmission, it practically does so by doubling the capacity of every wire.

THE Morse memorial meetings throughout the country have been of the most intensely interesting and imposing character. To all of these we would gladly have thrown open our columns had it been possible. Yet there is so great similarity in expression, in sympathy, in the ascription of well-defined honor to the dear dead so lately by our side, that we feel that already enough has been said. Imposing proceedings have been held at Boston, Washington, Philadelphia, Rochester, N. Y., Frederick, Md., Memphis, Tenn., Pensacola, Fla., and hundreds of other places in which the most distinguished citizens heartily and feelingly joined. Never in man's history was a life more complete. Even the enmity of the few who sought to sully his name is hushed and silent by the side of the flower-strewn tomb where the good man sleeps.

WOMEN telegraphers in Baden do not seem to meet public expectation. Carefully selected young women were, a few days since, placed in charge of the offices under that Government, and it was not long before unaccountable delays began to be observed in the transmission of messages. It has just been discovered that the operators have made it their regular practice to defer any petty dispatches about matters of State or business until they had finished sending each other glowing accounts of parties and dresses and delicious bits of gossip. The result is that the powers that be have ruthlessly dismissed the fair offenders and re-instated the old employes.

K. S. V. RANDOLPH, a practical operator of many years' experience, is making arrangements for opening an Evening Telegraphic Institute in this city.

Persons of either sex desiring to acquire a knowledge of Telegraphing, as applied to Commercial or Railroad service, together with the system of Bookkeeping pertaining thereto, can ascertain all particulars by addressing Box 3393, New York.

WE have received a lithographic sketch of the new building of the Montreal Telegraph Co., in Toronto, and nothing could better illustrate the prosperity and vigor, and public spiritedness of the management of that company. Whatever Hugh Allen touches seems to turn to gold, and no man is more fortune in the men who serve under him. Mr. Dakers the Secretary at Montreal and on whom a large amount of executive work depends is a gentleman whose personal worth and earnest devotedness to his work, is as well known and for as many years as the system itself. How he enters into the enjoyments of those who serve under him is seen in his presidency of the Montreal Snow Shoe Club, and it must be a rare sight to see the now venerable secretary and the boys "sledding" down the Montreal hill sides in the moonlight winter nights, with a whoop and a yell such as would frighten out of his propriety a New York executive. Glorious old James Dakers, may you slide down your last hill as merrily and as glad of heart. Not less marked as a rare executive officer is our friend Mr. H. P. Dwight the Superintendent. By rare practical talent, energy and appreciation of the public wants, he has made the Canadian telegraph system unique in telegraphic management, and as popular as it is liberal and successful. The new building, large, roomy and elegant in all its parts, is a sufficient commentary on the management which made it possible to build it, and the magnitude of the business which made it essential.

IN answer to an enquiry we reply that there is no life of Professor Morse extant. This was to have been our Summer's work, but we now hesitate to undertake it, although it was Mr. Morse's desire that if done, we might do it. We have two very large photographs of Prof. Morse on hand, cost $5 each, by Bogardus. Three fine engravings of him will be sent, post paid on receipt of twenty-five cents.

MR. S. ROBERTSON, formerly General Superintendent of the North-western Telegraph Co., has been elected Vice President of that Company, and Mr. Chas. H. Haskins has been elected General Superintendent. These are most excellent appointments conferred on worthy men.

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MANY communications come to us about vacations and the duties of employer and employed in reference thereto. We wish we had the power to order a general suspension of labor for all the leafy month of May or June, or its later sister, July, so that every operator, messenger, and manager could off to the woods or wheresoever they might list. But these are matters of government we pretend not to understand, except on the general assumption of the benefit to all of one brief breathing time in the circuit of the year. We leave, as we must, the possibility of granting furloughs to those whose business it is, and to the circumstances under which they may be granted or denied. To one or two points we call attention:

To grant a furlough, implies that the labor of an office can be performed by less than the usual help, or that the business is so slack as to permit of the absence of part of the usual force. Now, no establishment managed on correct business principles ever undertakes deliberately to provide for such a necessity. And the executive of a company has no right to do so. Their business is to provide sufficient force for the public service, at fairly remunerative salaries, and no more. In the telegraph offices where one man is appointed to a single wire, it is easy to see that even a diminished business does not give, as it might in other pursuits, the opportunity of one man doing the work of two, although it is sometimes done. A reduced or enlarged business on a wire, each still alike calls for the care and attendance of the man who serves it. If he goes, and one man serves two wires, the danger is, that it will be at the hazard of the detention of business. Two calls at the same time must result in one having to wait for the other. It is this which makes companies fearful of the absence of their men. It is a most difficult point to solve, how, without an actual increase of the usual necessary force, furloughs can be given at all, and how far a company is justified in thus increasing its force.

A pleasant correspondent remarks: "granted that this policy puts money into the company's treasury, has it not something of the appearance of selfishness? What else can it be called when the health and strength of those who make the money for a corporation are sacrificed for the sake of a few thousand dollars increased receipts yearly?" Now, all business is selfish and nothing else. The lines are built to make money, and the operator labors for the same end. It may be very sordid, but we live in a very sordid world, and the interest and duty of a company is to make it pay, and yet preserve all those moral obligations due from man to his fellow, which no position or business can ignore. If vacations will secure health and improved capacity of service from operators, it is the interest of companies to grant every facility for securing the greatest bodily vigor, and will do so, if from no higher motive, from selfishness alone. We have no doubt that the time will come, that with the company's successful arrangement of its capital, its thorough hold on Society as an acknowledged permanent integral part of the chief national industrial agencies, these questions of health will form a more conspicuous part of its policy. It has commenced providing for its dead It will not long forget the living.

THE firm of F. L. Pope & Co., manufacturers of the Nonpariel machinery, already so widely known and in use, have removed to 194 Fulton Street, N. Y., where they are not only more accessible but have more ample room to transact their increasing business.

FROM St Louis we have the following circular, to which we give publicity with much pleasure. By a kind of instinct Railroad companies are very generally employing telegraph experts to the service of train dispatching. The telegraph is a great necessity now in the arrangements of all Railroad train management, and the interest in the service is shown in the numerous letters we have published on that subject. We hope the convention will be held, and be fruitful of good. It has our heartiest approval, and the tender of any aid we can render it.

TO ALL TRAIN DISPATCHERS.

St. Louis & Iron Mountain Railroad Co.,
Office Supt Telegraph and Train Dispatcher,
St. Louis, April 6, 1872.

DEAR SIR.—The question of a general system of "Train Dispatching" for the Railroads of the United States is becoming a most important one, and I consider it to the advantage of all Railroad Companies, and those interested in their management, to co-operate in my efforts to call together a convention of Chief Train Dispatchers from all parts of the United States and Canada, for the general interchange of ideas, the establishment of the best and most uniform system of train dispatching, and, if deemed desirable, to form an Association, to hold stated meetings, and the appointment of Committees to report upon such business as may come before the Convention.

I would therefore respectfully suggest the propriety of your consideration of this matter, and would be pleased to have your views upon same as soon as possible, in order to make the necessary arrangements for assembling the Convention at such place as may be decided upon. Very Respectfully,

W. W. WELLS,
Supt. Telegraph and Train Dispatcher.

WE have to record the death of Mr. Richard Waterman, of Lafayette, Indiana, night operator and train dispatcher of the T. W. & W. R. R. Co., at that place, the result of an attack of typhoid fever in the Summer of 1871. He died April 8th of consumption, in his 24th year. Mr. Waterman was a man of exemplary christian character, and was the main support of his parents. He was a member of the Telegraphers Insurance Association.

OSCAR JENNINGS operator Western Union Telegraph Co. at Chicago, died in that city April 24th.

IN reply to H. we have to say that if the propriety of opening an office on Sunday for any period is granted, it is not possible to exercise any discrimination in the messages received, except to exclude those of obvious obscenity, or profane. Yet we would be glad to see Sabbath labor limited to the utmost. On the general question we cannot now with propriety enter.

H. W. B. does not perceive that to give Reds all the advantages of full paid messages would be to give a preference to Reds not at all contemplated. It would draw unduly from the day service and for which the Company is not yet prepared.

SENATOR RAMSEY has again introduced the subject of the Postal Telegraph in the U. S. Senate. No action is expected thereon during the session.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
May 1, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since April 15, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

40 Athens, N. Y., reopened.
271 Arcadia, Ind.
328 Altamont, Ill.
328 Beecher City, Effingham Co. Ill.
436 Bedford, Iowa.
52 Broadway, N. J.
281 Bridgeport, Ind.
65 Coventry Sta., N. Y.
57 Clayville, N. Y.
299 Clinton, Ind.
407 Colo, Iowa.
336 Cazenovia, Ill.
25 East Brookfield, Mass.
319 Fairfield, Ill.
21 Framingham, Mass.
147 Greenbush, Mich.
417 Garden Groove, Iowa.
41 Glen Cove, L. I., N. Y.
427 Jamesport, Mo.
316 Lyons, Wis.
488 Lake, Texas.
227 Montezuma, Ga., reopened.
41 Metuchin, N. J.
260 Middleville, Mich.
57 North Brookfield, N. Y.
299 Newport, Ind.
233 Newport, Ky.
319 Norris City, White Co., Ill.
59 North Wales, Pa.
357 Oscow, Ill.
305 Pensacola Junction, Ala., reopened.
456 Platte City, Mo.
36 Petersburgh, N. Y.
41 Roslyn, L. I., N. Y.
41 Ridgewood, N. J.
298 Shererville, Ind.
299 Seeleyville, Ind.
52 Stewartsville, N. J.
57 Washington Mills, N. Y.

OFFICES CLOSED.

Red River, N. Mex.

GENERAL INFORMATION.

Offices which have recently received new rates to Jersey City, N. J., will charge the same for Marion and Hudson City, N. J., and 15 cents more than New York rate for Hunters Point, L. I.

Hereafter the "Tariff for other lines" from Great Falls, N. H., to Wakefield, N. H., will be 25 and 2.

Offices having "Special Sheet A.," will hereafter check Newport, Ky., same as "special rate" to Cincinnati, O., and Canastota, N. Y., same as "special rate" to Rome, N. Y.

Attention of special offices north and west of Washington, D. C., is called to special rate to Savannah, Ga. The rate was made one dollar more than special rate to Washington, D. C., October 11th, 1871. Square rates then in force were not to be increased.

ATLANTIC CABLE BUSINESS.

On and after May 1, 1872, the ten word minimum on business between all W. Union offices and points in Great Britain and Ireland, will be abolished.

The tariff will thereafter be computed by multiplying the number of words, whether more or less than ten, by one tenth of the present rate for ten words (or by the present rate for additional words.)

This change does not apply on business destined for points bayond England.

WILLIAM ORTON, Pres't,

IN reply to F. H. I. we answer. The earth is an infinitely large conductor, and to our mind, practically acts as a return wire, except that, because of its great volume, it is without appreciable tension. There is a scientific way of stating this, but it amounts practically to this although seemingly denying it. The "flow" of the current as it is called, is not now admitted to exist. Atoms of matter change their relation to each other, or, as it is called, become polarized.

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TELEGRAPHERS INSURANCE ASSOCIATION.

RECEIVED ON ASSESSMENT NO. 25.

22 39 230 298 386 642 643 771 801 851 1041
1105 1106 1107 1109 1110 1112 1113 1115 1119 1120 1121
1122 1123 1127 1130 1131 1261

RECEIVED ON ASSESSMENT NO. 26.

230 298 386 1041 1261

ASSESSMENTS 26 AND 27.

13 15 17 19 39 42 43 46 51 65 70
74 84 86 97 100 108 111 120 127 178 206
213 215 218 252 277 288 319 323 333 379 414
422 434 440 478 484 511 512 542 570 579 587
588 600 603 604 618 630 642 643 655 659 660
667 694 702 708 712 729 731 758 764 771 780
795 801 808 851 856 868 905 906 914 1008 1009
1024 1028 1035 1048 1056 1057 1063 1066 1077 1084 1085
1100 1101 1103 1105 1106 1107 1108 1109 1110 1112 1113
1115 1116 1117 1119 1120 1121 1122 1123 1127 1130 1131
1139 1161 1170 1177 1178 1190 1210 1240 1244 1246 1256
1259 1267 1275 1292 1299 1305 1335 1360 1361 1368 1380
1399 1411 1424 1426

RECEIVED ON ASSESSMENT NO. 28.

280 319 323 414 570 868 1108 1116 1117 1210 1267

ASSESSMENTS 28 AND 29.

6 15 17 23 25 26 28 29 42 44 46
52 53 56 60 61 72 76 77 78 80 82
86 88 91 93 99 101 103 107 113 120 121
126 127 131 133 134 145 146 148 157 175 176
177 179 183 192 199 201 202 210 217 218 220
231 235 243 244 245 247 251 254 257 275 276
280 291 302 316 333 349 350 351 352 353 361
367 380 383 385 391 402 405 406 413 416 420
425 426 454 463 464 478 484 508 510 511 512
515 524 526 532 536 546 547 548 553 555 556
557 562 566 577 579 581 590 592 594 600 602
603 604 608 618 629 632 642 643 655 656 659
661 662 663 665 669 672 685 694 708 711 715
720 721 729 731 734 735 741 764 769 772 776
781 782 783 785 786 791 795 797 802 803 804
812 815 820 821 822 832 836 838 841 848 856
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1510

BALTIMORE, MD., March, 23d, 1872.

To the Editor of the Journal of the Telegraph:

A thought occurred to me of a plan by which the membership of the Telegraphers Mutual Life Insurance Association might be increased if the rules of the Association were such as to admit. I allude to it in my own imperfect way—hoping a discussion of the subject may follow with some beneficial results.

It is this: If our brother and sister operators who do not think it necessary at present to insure, would grant other members the privilege to effect an insurance on their lives, I do not doubt there are many could be found willing to carry a number of policies in view of receiving in the event of death the amount due on the party insured. Or as a speculation to hold until the person whose life is insured may make up his or her mind to purchase the policy and thus become a member in fact.

Instances sometimes occur where a brother or sister, after protracted illness, may not be in condition financially to keep assessments paid up. For the benefit of such, would it not be well to make some provisions by which policies held by them could be prevented from dropping off by default. Since they cannot be reinstated under the present rules of the Association, unless by paying up arrears. I think there should be an effort made to aid in some way a continuation of membership. Will the Association secure me even the amount required to pay—arrearages for those in default if I bring them again within the fold. Respectfully,

"TEMPERANCE."

There is no objection to any one paying up dues owing by another, but money at death can be paid to designated heirs only. It is not a proper field for speculation.

INSURANCE IN THE WEST.

I did not expect when I sent you the letter which you published in last JOURNAL, to make myself a general Western medium for the "Telegraphers Life," but it would seem that such is the accepted fact. I am daily receiving applications for blanks from those desiring membership in the Association, from all parts of the West; have heard from Iowa, Missouri, Michigan and Kentucky, with Ohio included. I am glad to see a feeling manifested to strengthen and increase our Association, and will cheerfully do my part. Those sending applications to me, will have to furnish additional stamps for return of certificate, unless they wish them sent direct from New York. It seems from the tone of the letters, that our Western operators don't know who the proper New York officers are, and seeing my name at the end of your letters published, apply to me for instructions. I will keep you informed as to telegraphic news, &c., hereabouts.

Yours truly, H.

DELAYED PAYMENTS.

ST. JAMES, MO., March 28th, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR,—I wish to call the attention of members of the Telegraphers' Mutual to a resolution, passed long since by the executive committee, setting apart delayed payments on assessments for expense account. Under the articles of association the heirs of deceased members are entitled to one dollar for each member in the association at the time of the death. This resolution diverts money that belongs lawfully to dependents of deceased members to other uses than that intended. Money, too, that is often badly needed by those to whom it rightfully belongs. Expenses of the association must be met; but a special tax ought to be assessed for this purpose, and not by taking from the heirs of deceased members.

I, for one, would willingly pay a reasonable extra assessment for this purpose, and have no doubt but that the majority of the association would; and, thereby, relieve the orphans of the expenses incident to the workings of our order.

Please submit the spirit I have attempted to express above to the association, and in so doing greatly oblige Yours, J. B. MORGAN.

The subject is one fairly open to criticism, yet there should be some date at which an account should close, and the settlement should be complete when made. Practically, it has had little operation, as complete settlement has been delayed until all but a few straggling remittances have been received. What goes to expense account is from those who, by the rules, have been excluded, and who are re-admitted on application and payment of back dues.

To the Editor of the Journal of the Telegraph:

A young lady operator copied a message the other day in which occurred the question, "Where is Mother French?" Her copy read, "Where is monkey wrench!"

Another operator, a brilliant youth, received a railroad message in which the word *signal* occurred three times. Just as he had finished copying the message he left for supper, being relieved by another operator. His relief took up the message from the table and puzzled over it a long time, but could not understand it, as it was written in three paragraphs, with "nal" under each, and the signature at the bottom.

Upon the return of the "gay and festive cuss" who received the message, he said it was "three messages in one," and asked, "Who is *Nal?*"

He thinks of applying for a position as train dispatcher!

This reminds me of a similar bull which was made at the time of the laying of the first Atlantic cable. A copy of an official dispatch, signed by Cyrus W. Field, was sent to the operator at ——, who copied the signature thusly:—

Sig——

"*Ned Cyrus W. Field,*"

and sent it with that signature to the chairman of a large public meeting, which was being held at the time, who read it to the audience. I never knew till then that Mr. Field's first name was *Ned!*

AUGUSTUS.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—I would like to give the readers of the JOURNAL an opportunity for a "hearty laugh." A gentleman came to my office to send a message, and after writing it, waited as people often do at small offices, to see it sent. I called office, and operator came to key and said, "Busy, wait a minute," so I leaned back in chair to wait, when the gentlemen said, "Have you sent it?" I said "no, they say they are busy, to wait a minute," whereupon he said, looking surprised, "Why, I didn't hear them," and then added, brightening up as if he had thought of the reason, "but I'm *a little deaf in one ear!*" I think I managed to keep a straight face till he left but it was hard work, and those to whom I have related it seemed to enjoy it so much, I thought the readers of the JOURNAL might.

Respectfully, M.

ONE should never impart anything to a woman under the seal of secresy. This old experience was lately renewed by a telegraph operator at the railroad station of Friesack, near Berlin.

He received, namely, a telegram from a merchant in Berlin, who had married some four months previously, the daughter of the Mayor of Friesack, addressed to an employer of the railroad company, which read, "Send hear immediately your daughter as wet nurse. A little boy has arrived with us." This piquant news the operator told to his wife "under the seal of secresy," and she under the same promise, hastened to impart it while fresh to her friends. After the lapse of an hour the whole of Friesack was aware of the news. The operator was condemned to three months imprisonment, and various persons were fined five dollars each, for slander. The parties have appealed and will obtain a new trial.

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A DISGUSTED TEXAS PLUG.

CORSICANA, Texas, Feb. 23.

To the Editor of the Journal of the Telegraph:

I am a young man desirous of completing my course, over half accomplished, as an agitator of the Electric Fluid. I have written to various operators and superintendants, exhausting time, patience and money to that end. Finally, succeeded in getting into Corsicana, Texas, office, where, the operators employed, seem to treat me with contempt; the office is somewhat scant of furniture, and I was compelled to purchase a box to sit on. Every morning when I came on hand to practice or listen at the batteries, I find my box nailed to the wall, about ten feet from the tables. The operators give me no show at all; seem to be too busy to reply to a civil question, else they make out so. Is there no redress, and are all operators of same disposition toward beginners? I appeal to you for advice, and hope you will favor me with an answer, through your valuable paper. Do you think I can get these two operators discharged, and how shall I go about it? To give you a sample the way I am treated, I asked one of them if he *honestly* thought I ever would learn; his answer was couched in terms insulting in the extreme, "said: He thought the agricultural interests of the country was going to rack and ruin, just by the absence of my sort from the field."

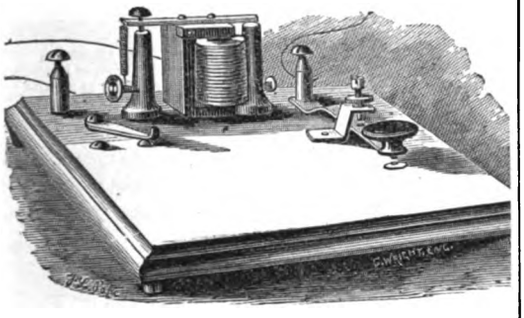
Where can I complete my course, and at what price? Respectfully refer you to Rev. W. G. Veal, M. E. Church South, Presiding Elder, for character and respectability.

Yours, much disheartened,

D. B. ADAMS.

THE NONPAREIL TELEGRAPH APPARATUS.

(Patent applied for.)



This apparatus supplies a want which has long been felt, viz.: that of a SIMPLE and CHEAP

MORSE TELEGRAPHIC INSTRUMENT,

with all the necessary Batteries and other appurtenances in a CONVENIENT and COMPACT form.

By means of a switch, which is now placed on each instrument, they can be worked as desired, either as the open or the ordinary continuous, or closed circuits.

It is intended especially for the use of

STUDENTS, AMATEURS, AND OPERATORS,

but will be found to be equally well adapted for use on

PRIVATE TELEGRAPH LINES,

or Short Lines of any description, which are not over three or four miles in length.

A NEW FORM OF BATTERY

is employed, which is compact, efficient, and economical, and especially adapted to the purpose for which it was designed. Each instrument will be accompanied by a

BATTERY, CHEMICALS, INSULATED WIRE for connections, together with an

ILLUSTRATED BOOK OF INSTRUCTIONS,

which in itself forms a complete elementary treatise upon the ART OF TELEGRAPHY.

PRICES:

Single Instrument, complete, with Batteries, etc.....$8 00
Two Instruments, " " " " 15 00

Sent by Express on receipt of price.

Remittances may be made by Post Office Order, Registered Letter, or Draft payable to our order. Persons ordering Instruments will please write plainly, giving Post Office, County, and State, with instructions for shipment. Address,

F. L. POPE & CO.,
P. O. Box 6010. 194 Fulton Street, New York.

THE NONPAREIL TELEGRAPH APPARATUS may be procured through the leading dealers in Telegraph Supplies throughout the country.

☞ SEND FOR A CIRCULAR. ☜

16,000 MILES

OF

"JOHNSON'S" WIRE

USED BY THE

TELEGRAPHS OF THE UNITED STATES

DURING THE YEAR 1871.

This is sufficient refutation of all the intimations thrown out by the Manufacturers and Importers of other Wires, reflecting upon the acknowledged superiority of the Wire manufactured by

Messrs. RICHARD JOHNSON & NEPHEW,

MANCHESTER, ENGLAND.

Their Works are the Largest in the World.

The great advantage which they possess over other manufacturers is their patent process of drawing Wire in great lengths (averaging 1,200 feet).

All Telegraphers know that, in nine cases out of ten, breaks in Wire occur at joints, hence the less joints the fewer breaks.

Messrs. RICHARD JOHNSON & NEPHEW furnish three-fourths of all the Telegraph Wire used by the

ENGLISH GOVERNMENT.

This Wire is necessarily subject to the tests, etc., imposed by the English Post-office Department.

A large stock always on hand and for sale at the lowest market prices—both free and in bond.

TELEGRAPH LINES

OF ANY LENGTH FULLY EQUIPPED WITH

Wire, Insulators, Batteries, Instruments, &c.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET,

NEW YORK.

Sole Agents for "Johnson's" Wire.
" " " American Compound Wire.
" " " Cauvet's Patent Screw Insulator.
" " " Sam'l C. Bishop's Insulated Wires and Cables.
" " " Brooks' Patent Paraffin Insulators.

Manufacturers of every description of

TELEGRAPH APPARATUS.

CALLAUD BATTERY,

KEPT ON HAND,

AND

Orders filled by

H. R. DAVID,

17 Platt Street, New York,

W. MITCHELL McALLISTER,

728 Chestnut Street, Philadelphia,

CHARLES WILLIAMS, Jr.,

109 Court St., BOSTON, MASS.

AND BY

GRAY & BARTON,

Agents for the United States,

479 State St., Chicago, Ill.

AMERICAN FIRE ALARM

AND

POLICE TELEGRAPH.

GAMEWELL & CO., PROPRIETORS,

NO. 104 CENTRE STREET, NEW YORK.

J. W. STOVER,
General Agent and Superintendent.

L. B. FIRMAN, Chicago, Ill.,
General Agent for the West and North West.

J. R. DOWELL, Richmond, Va.,
Special Agent for Virginia and North Carolina.

J. A. BRENNER, Augusta, Ga.,
Special Agent for Georgia and South Carolina.

L. M. MONROE, New Canaan, Conn.,
Special Agent for New England.

This system of Fire Alarm and Police Telegraph, with a Central office, or upon the

AUTOMATIC PLAN,

is now in operation in the following cities, to which reference is made for evidence of its great SUPERIORITY, VALUE and UNIFORM reliability:

Albany, .N Y.,	New Orleans, La.,
Alleghany, Pa.,	New Haven, Conn.,
Boston, Mass.,	Newark, N. J.,
Buffalo, N. Y.,	Omaha, Neb.,
Baltimore, Md.,	Philadelphia, Pa.,
Chicago, Ill.,	Pittsburg, Pa.,
Cincinnati, Ohio,	Portland, Me.,
Columbus, Ohio,	Peoria, Ill.,
Cambridge, Mass.,	Providence, R. I.,
Charlestown, Mass.,	Quebec, L. C.,
Covington, Ky.,	Rochester, N. Y.,
Detroit, Mich.,	Richmond, Va.,
Dayton, Ohio,	Indianapolis, Ind.,
Elizabeth, N. J.,	St. Louis, Mo.,
Fall River, Mass.,	St. John, N. B.,
Fitchburg, Mass.,	Springfield, Mass.,
Hartford, Conn.,	San Francisco, Cal.,
Jersey City, N. J.,	Savannah, Ga.,
Louisville, Ky.,	Syracuse, N. Y.,
Lawrence, Mass.,	Troy, N. Y.,
Mobile, Ala.,	Toledo, Ohio,
Montreal, Canada,	Toronto, Canada,
Milwaukee, Wis.,	Washington, D, C.,
New York City,	Worcester, Mass.,
Lynn, Mass.,	New Bedford, Mass.,
Lowell, Mass.,	Bridgeport, Conn.

The distinctive features of these systems of

FIRE ALARM AND POLICE TELEGRAPHS.

ARE,

First—The AUTOMATIC SIGNAL BOXES, the simple electro-mechanism of which enables any one—even a child—to give an *instantaneous, general,* and *definite* alarm of fire.

Second—The AUTOMATIC REPEATER, through which the apparatus may be distributed in a combination of circuits, and the entire system successfully worked without the constant personal attention of either operators or watchmen.

Third—The ELECTRO-MECHANICAL BELL STRIKERS, adapted to produce the full tone of the largest church or tower bells.

Fourth—The ELECTRO-MECHANICAL GONG STRIKER, for hose and engine houses, by means of which the location of the fire is instantaneously communicated to the members of each fire company.

These features combined form the

ONLY PERFECT, COMPLETE, AND RELIABLE SYSTEM

OF

FIRE ALARM TELEGRAPH IN THE WORLD.

Messrs. GAMEWELL & CO. are the owners of the original *FARMER AND CHANNING PATENTS,* one of the most important of which has just been extended for seven years. During the past seventeen years they have spared no expense or effort to secure improvements, and the systems are now covered by

MORE THAN TWENTY PATENTS.

The introduction and operation of the

AUTOMATIC SYSTEM

involves so little expense, compared to the benefit which it confers, that even small communities can profitably adopt and maintain it.

The co-operation of TELEGRAPHERS in securing its introduction into their localities is cordially invited, and their efforts will be duly appreciated and compensated.

Any information desired in regard to the above system will be cheerfully and promptly furnished upon application at the office.

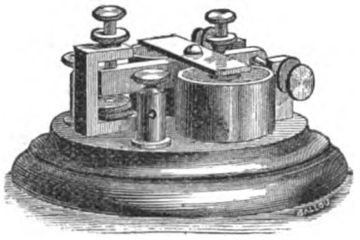
A pamphlet setting forth more fully its advantages and superiority, has been printed, and will be supplied to Municipal Authorities and others interested in Fire Alarm and Police Telegraphy upon application as above.

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Manufacturer and Dealer in all kinds of

Telegraph Supplies.



A VERY FINE NEW STYLE

SMALL SOUNDERS,

Polished Rubber Covered Magnets, $6.00.

The same, on Mahogany Base and Silver Plated, . . . $9.00

Agent for

Pope's Nonpareil Apparatus,

AND

PUTT & CO.'S MECHANICAL INSTRUMENTS

FOR LEARNERS.

Above Instruments kept constantly on hand at manufacturers' prices.

Materials for Private Telegraph Lines,

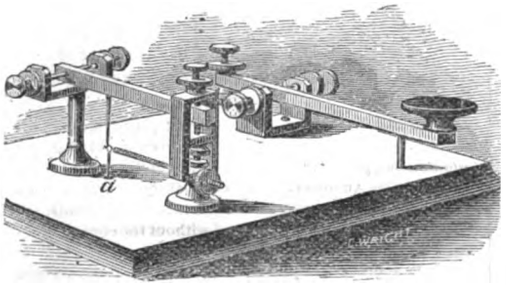
With instructions for putting up and operating.

M. A. BUELL,

26 Waring Block, Cleveland, Ohio.

MECHANICAL TELEGRAPH INSTRUMENT

PATENTED MAY 31st, 1870.



For Students, Colleges, &c. No battery required. An ordinary key and sounder is placed upon a proper base. The sounder is moved by a lever under the base, connected with the key, making a perfect instrument for those wishing to learn the Art of Telegraphy. An expert could not tell, without examining it, that the instrument was not worked by a battery.

It should be introduced into every school and family where there are those who wish to learn the Art.

Hundreds of persons throughout the country desire to become expert Telegraphists, and are constantly seeking permission to practice in the various telegraph offices.

This instrument is an outgrowth of this pressing demand. The Inventor is himself a practical operator, now in active service. Operators and others wishing to teach or learn the Art, will be delighted with this instrument.

It can be placed anywhere, as it does not occupy a space more than six inches square.

Its cost is but $7, and there is no expense whatever to keep it constantly in working order.

We will send a copy of SMITH'S MANUAL, free of charge, with each instrument, to individuals or clubs. The instructions in this Manual are particularly adapted to those who wish to learn by sound.

Special and liberal terms to manufacturers.

Remittances can be made by certified draft on New York, Cleveland, or Pittsburgh, money by express, charges paid, post office order, or registered letter at our risk.

Parties ordering instruments, from points except well-known cities, will please give the name of county and State.

Price, $7. Silver Plated, Extra Finish, $10.

Address, D. W. PUTT & CO., Wellsville, O.

D. W. PUTT,
P. BRUNER,
W. H. RILEY.

These instruments can also be procured at the same price from L. G. Tillotson & Co., New York; Bliss, Tillotson & Co., Chicago, Ill.; Chas. Williams, Jr., Boston, Mass.; M. A. Buell, Cleveland, O.

WIRE IN BOND.

For the accommodation of the

SOUTH AMERICAN, CUBAN and MEXICAN TRADE,

we shall hereafter keep a stock of the Celebrated

"JOHNSON" WIRE,

both plain and Galvanized, in Bond, ready for shipment from New York.

PRICES AS FOLLOWS:

No. 9, Plain Annealed	4½ cts. Gold.
No. 9, Galvanized	5½ "
No. 8, Plain Annealed	4¾ "
No. 8, Galvanized	5 "

This Brand of Wire is the best in the world, and has been adopted exclusively by the Western Union and many other Telegraph Companies.

We also continue to import this Wire for use in this country, notwithstanding the high rate of duty imposed by Congress in the interest of the monopolists. Any amount of it can be seen at our store at all times. The import duty on wire is now two cents per lb. gold, and 15 per cent. *ad valorem.*

L. G. TILLOTSON & CO.,
No. 8 Dey Street, New York,
Bliss, Tillotson & Co.,
247 So. Water Street, Chicago,

Sole Agents in the United States for "Johnson's" Wire.

Manufacturers of every description of

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104 CENTRE STREET, N. Y.,

TELEGRAPH ENGINEERS,

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INSTRUMENTS, BATTERIES,

AND EVERY DESCRIPTION OF TELEGRAPH SUPPLIES.

Offer the best guaranty of excellence in their profession—in their long established business—in the extent and variety of their manufacturing facilities—in the many improvements introduced by them, now almost universally adopted or imitated—and in the extent of their business, domestic and foreign, enabling them to keep pace with telegraphic progress.

They publish an Illustrated Descriptive Catalogue of their leadby manufacturers, to which they respectfully refer.

SCREW GLASS INSULATORS AND BRACKETS,

Of the size and thread used by the Western Union Telegraph Company.

Having secured an Exclusive Agency for these Insulators, (manufactured under the Cauvet patent,) we are filling orders promptly for large or small quantities, at prices as low as any Insulator can be sold for in the market.

GRAY & BARTON,

479 State St., Chicago.

CHARLES WILLIAMS, Jr.,

(ESTABLISHED 1856,)

109 Court Street, Boston,

Manufactures and has for sale the various kinds of

OFFICE AND MAGNET WIRES,

Including Cotton Covered, Silk, Gutta Percha, Painted, Fancy, and

DAY'S KERITE COVERED WIRE.

Also, a full assortment of

BATTERIES,

For Telegraphing, Plating, Electrotyping and Experimenting.

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Fine Art Foundry,

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MEMORIAL FIGURES AND BUSTS,

ARTISTIC MONUMENTS, TOMBS, AND

FOUNTAINS, ALTAR RAILS, &C.

Estimates and Designs given.

Pickett's Statue of

PROFESSOR MORSE

erected at Central Park, was cast at this establishment.

M. J. POWER,

PROPRIETOR.

THE DARLING SELF-SUPPLYING PEN-HOLDER

CAN BE USED WITH ANY PEN.

WRITES TWO THOUSAND WORDS WITH ONE DIP OF THE PEN IN THE INKSTAND.

These Holders will be sent by mail, post-paid, on receipt of the price, on the following terms:

Cedar Holders, for Desk			$0 50
Ebony " "			0 60
Cedar " "	Ex. Plated		0 75
Ebony " "	Nickel Plated		1 00
Pocket Holders, Plain,	" "		1 75
" "	Chased, Ex. Plated		2 00
Six Cedar Desk Holders to one order			2 00

Send Registered Letter or Money Order for safety.

Address, W. A. COOKE, Agent, No. 6 State Street, N. Y.

OPINIONS.

NEW YORK, March 15, 1871.

Telegraph operators especially will find it almost indispensable after once having used it. All who have used it in this business speak very highly of it.

FRANK L. POPE,
Associate Editor of the "Telegrapher."

NEW YORK, April 21, 1871.

I fully accord in the above opinion of the Self-Supplying Pen-Holder, having tested it for some time.

SAMUEL F. B. MORSE.

FRANK L. POPE,

TELEGRAPHIC AND ELECTRICAL ENGINEER,

Nos. 78 and 80 Broadway, Room 48,

NEW YORK.

WM. KIDD, A. BOODY. C. H. PEIRCE, C. S. OTIS.

KIDD, PEIRCE & CO.,

BANKERS,

19 BROAD STREET AND 57 EXCHANGE PLACE.

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Stocks, Bonds, Gold and Government Securities bought and sold on Commission.

JOSEPH MOORE & SONS,

(Established 1820).

MANUFACTURERS OF EVERY DESCRIPTION

INSULATED WIRES

FOR TELEGRAPHIC PURPOSES,

535 & 537 CHINA ST., BELOW GREEN ST.

PHILADELPHIA, PA.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 12. NEW YORK, MAY 15, 1872. WHOLE NO. 109.

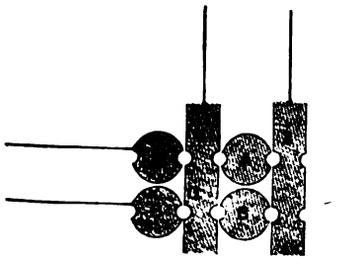
THE PEG SWITCH.

In our last issue we gave an illustration of a portion of one section of the switch in use in the New York office. The switch, itself, is known as the "peg," so called from the metallic plug, or peg, used in forming or changing circuit connections.

As the peg switch has been adopted by the Western Union Telegraph Company as a standard, it is, of course, desirable that all engaged in the business should become familiar with the principle of its construction. To this end we will describe it in its simplest form, devoid of spring-jacks and other auxilliaries which enter so largely into the composition of the New York switch. The peg switch is composed of a series of vertical metallic bars, or strips, to which are attached the line wires, and of a number of metallic buttons, or discs, placed horizontally. To these latter are connected the instrument wires.

The accompanying diagram shows the connections of the peg switch as adapted to the requirements of a way office. It is so simple, and yet so perfect, that only a very brief explanation of the reference marks upon the cut will be necessary to a full understanding.

1 represents a vertical metallic bar, or strip, upon the switch, to which is connected a wire running into an office, and 2 represents the same wire going



out. A and A′ and B and B′ are metallic buttons, to which are connected the instrument wires. All the buttons upon the same horizontal line are connected together at the back of the switch.

As shown in the cut, the circuit is "open." To close it, with instrument in circuit, it would be necessary only to insert two metal plugs, or pegs; one at the orifice at B′ and 2, and one at A and 1. The course of the current would then be as follows: From the line at 1 through the peg connection at A to instrument; through instrument to B and B′; through the peg connection there to the line at 2, and so out to the main line. Should it be desired to connect the line through, without instrument in circuit, the insertion of pegs in the orifices of either A′ or B′ would effect the desired result.

The same form of switch, with a modification of connections, would answer for a terminal office.

For this, let it be understood that a wire, leading from a battery, one pole of which is grounded, is taken directly to one side of the instrument; through the instrument it goes to A; from A, if a peg be inserted in its orifice, it goes to 1 and to the main line.

If, instead of placing the peg at A and 1, it be placed at A′ and 2, the instrument would be connected to line 2.

It will be seen that in the terminal form, but one line wire is necessary to be on the switch, and but one wire to the instrument to form a circuit, while in the way form two of each are required.

POSTAL TELEGRAPH SCHEME.

We give herewith the letter of Mr. G. B. Prescott, Electrician of the Western Union Telegraph Company, to the Hon. James B. Beck, of Kentucky, upon which was based the masterly argument delivered by him in the House of Representatives at Washington, January 27, 1872, against the latest effort of, or more properly speaking, perhaps, the latest scheme of certain designing parties, who are endeavoring to obtain possession of the various telegraph properties in the United States, by coercion through Congress. The letter, in itself, is so complete, as to fact and statistics, that it will be read with general interest.

There is certain valuable statistical information in tabular form, appended to the document, but which, however, is so well covered by Mr. Prescott, in his letter, as to render its reproduction, here, unnecessary:

ELECTRICIAN'S OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, January 16, 1872.

DEAR SIR: Mr. Orton has handed me your favor of December 28, with directions to furnish you with such information in my possession as you require. I therefore inclose, herewith, statements showing the number of miles of line and wire, and number of instruments in operation in all the countries of Europe, altogether, with the number of telegraph offices, population, number of messages sent, and the receipts and expenses of the service. The statistics for the continental countries of Europe are for the year ending December 31, 1869, the latest year for which complete returns have been received; while those for Great Britain and Ireland are for the fourteen months ending March, 31, 1871.

In Europe the telegraph system embraces 175,490 miles of line, 475,007 miles of wire, and 15,503 offices. The number of messages transmitted was 33,141,386, the gross receipts for the transmission of which were $15,146,551.20 in American gold currency, and the expenditures $19,558,016.76, being an excess of expenditures over receipts of $4,411,465.56. The tolls for the transmission of messages are not the same for any two countries in Europe, nor are they uniform for all classes of messages in any one country. Telegraphic correspondence in Europe is divided into two general classes, called internal and international messages. The internal messages are those which are received, transmitted and delivered in the same country. The international messages are those which are received in one country and transmitted into another. As a general rule, a low rate of charges is adopted for the transmission of internal messages, while a higher tariff is imposed upon international messages. The average rate for internal messages throughout Europe is thirty-six and six-tenths cents, and for international messages $1.01. In the official report of the telegraph system of the United Kingdom of Great Britain and Ireland, the internal and international messages are not stated separately, only the total number, including both classes, being given, but the average tolls upon the whole service amounted to forty-two and a half cents per message. The average expense per message for the performance of the telegraph service in America and Europe was about the same, although it is well known that skilled labor is much more expensive in this country than in Europe. It would appear from the results that although the telegraphists in Europe get less pay for their labor than similar employes receive in America, a larger number are employed there than here to perform a given amount of work. As it is, however, to Great Britain that the Postmaster-General invites especial attention as having given to the telegraph a practical test of the public system as compared with that under private control, I will point out the leading features of its operation in that country.

On the 5th of February, 1870, the telegraphs were transferred to the British Government. At the date of the purchase the various telegraph companies of the United Kingdom possessed sixteen thousand miles of line and eighty-five thousand miles of wire. For this property the British Government have already paid, according to the official report of Mr. F. J. Scudamore, the second secretary of the Post-Office Department, £7,500,000 sterling, or $36,450,000 in American gold currency.

This sum of money, however, does not comprise the entire sum which the British Government must pay to acquire the control of all the telegraphs in the United Kingdom.

Arrangements have been made with sixteen railway companies for the purchase of their telegraph interests, in which the compensation consists partly of capital sums and partly of annual payments, and with six other railway companies, in which the compensation consists wholly of annual payments; and there yet remain, according to Mr. Scudamore's report, made to the House of Commons on the 12th of July, 1871, forty-four railway companies in various parts of the United Kingdom with whom the Post-Office Department has not yet come to arrangements as to the amount of compensation to be paid to them for the purchase of their telegraph interests.

From the above-mentioned official report the amount of telegraph revenue from the commencement of governmental control, on the 1st of February, 1870, to the 31st of March, 1871, was £798,580, or $3,865,127.20, and the expenditures for the same period were £1,397,389, or $6,763,362.76, being an excess of expenditures over receipts of $2,898,235.56. The disbursements are classified by Mr. Scudamore under the heads of capital expenditure and working expenses; the working expenses being stated at £470,495, or $2,277,195.80, and the capital expenditure at £926,894, or $4,486,166.96.

We ought not to be surprised that Mr. Scudamore, through whose efforts mainly the British Government was induced to purchase the telegraph lines, should make every endeavor to prove that the administration of the telegraphs by him was pecuniarily successful. I do not feel disposed to criticise his report in an unfriendly spirit, but I cannot refrain from remarking that the enormous excess of the capital expenditure over working expenses naturally leads to the suspicion that many charges have been carried to the former account which properly belong to the latter, and an examination of the detailed statement of the working expenses confirms the justice of this suspicion. Under capital expenditure is placed, not only the cost of extensions, amounting, as well as I can make out, to £178,933, but all manner of outlay upon the plant, such as the very important item of maintenance and repair, for which our company expends about a million dollars a year, £177,094 for engineering, salaries, wages, traveling and other expenses, a considerable portion of which should certainly be charged to current expenditure. Among the working expenses there are no charges for poles, wire, insulators, instruments, battery material, office repairs and furniture, and many other items which constitute a large annual charge to private telegraph companies; and if those expenditures which are improperly carried in Mr. Scudamore's report to capital expenditure were placed where they properly belong, I have no doubt but that the working expenses would be found to largely exceed the revenue.

The English telegraph system, when it was purchased by the Government, was the oldest, most extensive and, probably, the

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st managed in Europe. And there is no reason, if properly managed under Government control, why it should not have continued to give satisfaction; but since its acquisition by the Government, the complaint of bad service has been very general. The difficulties have been ascribed to the large increase in the number of messages offered for transmission, and to the inadequate preparations to accommodate the immense increase in the traffic which immediately followed the large reduction of rates, but according to the report of Mr. Scudamore, the average cost of inland messages is twenty-six cents, against an average cost prior to the transfer of thirty-eight cents, showing a reduction in price of less than one-third upon this class of messages, while there was no reduction whatever upon international messages. According to the same authority the total number of messages forwarded in the three quarters ending 31st December, 1870, was 7,563,015, which is a less number than was transmitted by the Western Union Telegraph Company alone during the same period; so that the difficulties complained of were not properly chargeable to the excessive amount of traffic performed.

The expenditure in a single year of $2,898,235 in excess of the receipts, the opening of 1,350 new offices, and the erection of over 45,000 miles of additional wire, ought to have vastly improved the capacity and value of the British system. The work of reorganization and extension was intrusted to the officers of the companies which were bought out, and the position of engineer-in-chief of the post office telegraphs was given to Mr. Culley, the former electrician of the Electric and International Telegraph Company, with a salary largely exceeding that paid by our Government to the Cabinet ministers. I see no reason why the British post office telegraph system should not equal any other in the world, nor why, at the rates charged, it should not be self-sustaining; but this does not tend to prove that the union of the telegraph and postal systems in this country would be a wise or profitable measure.

The British post office has long enjoyed an enviable reputation. It promptly and satisfactorily carries and delivers letters at one penny each throughout the United Kingdom, and makes a net profit of over five million dollars per annum; while our post office charges three cents for carrying a letter without delivery, except in the larger cities, and manages the business at an annual loss of over four million dollars. Of course it does not follow that because there is a large annual deficit in our post office that there would necessarily be one proportionally as great in the telegraph if managed by the same department, but when the success of the British telegraph is presented to us as a conclusive demonstration of the utility of the postal telegraph for this country, it seems proper to consider whether the management of our postal system is sufficiently analogous to that of the English to warrant the deduction that whatever is successfully undertaken by the British post office can be equally as well performed by our own.

When the project of a postal telegraph was first started, Mr. Gratz Brown proposed to establish a uniform tariff of three cents per message of sixty words. Mr. E. B. Washburne followed with a proposition to make the tariff fifteen cents for ten words, exclusive of address and signature; while Mr. C. C. Washburn at first proposed a uniform rate of twenty cents for thirty words, but subsequently changed it to twenty-five cents for twenty-five words, charging for address and signature. Mr. Creswell does not name the rate which he thinks should be established in the event of the acquisition of the telegraph by the Government: but perhaps the rate is indicated in the following query, extracted from his recent report: "Who, that desires to convey or acquire any information, would hesitate between sending a telegram from New York to California in seven minutes for twenty cents and sending a letter in seven days for three cents?"

If such a rate for the transmission of messages between the Atlantic and Pacific States by the postal telegraph shall ever be practically inaugurated, I have no doubt the letters carried by mail between these points will be materially reduced; but I apprehend that the annual deficit in the Post Office Department will not thereby be sensibly diminished.

The Postmaster General admits that a large sum of money will be required for the purchase of the present telegraph lines, but considers that delay will only add to the amount of purchase-money required. The Post-Office Department, he says, is now prepared to undertake the organization and management of the telegraph, in connection with its other duties, and can aid materially in raising the money needed for the purchase through post office savings banks, if Congress will authorize their establishment. To prove the feasibility of this latter scheme he refers to the history of the British post office savings banks, "which, after ten years operations, have in $75,145,690, a much larger sum than will be required for the purchase and thorough repair of all the telegraph lines in the United States." But is it probable that Mr. Creswell can purchase the lines for the sum named, even admitting that his postal savings bank scheme is successful. The President of the Western Union Telegraph Company, which operates fifty-six thousand miles of line, one hundred and twenty-five thousand miles of wire, forty-six hundred offices, and transmits over ten million messages annually, and whose revenue is more than double that of the British post office telegraphs, has recently publicly announced that his company is inflexibly opposed to any interference of the Government with its business or the acquisition of its property. Our company has been quietly pursuing for the past six years the same object which the British Government has been accomplishing since it acquired the control of the lines, namely: the unification and enlargement of the telegraph system, accompanied with an important reduction in the rates for transmitting messages. With the exception of half a dozen comparatively small connecting and competing lines, this company controls the whole telegraphic system of the United States, its lines covering a territory embracing twenty-five degrees of latitude and fifty-five degrees of longitude. Within the past five years the telegraphic facilities in the United States have been increased by the construction of thirty thousand miles of line, the erection of seventy thousand miles of wire, and the opening of over three thousand telegraph stations, and the annual increase is constantly augmenting. During the same period the average rate of tolls has been decreased fifty per cent. Is it probable that the telegraph would have made greater progress under Government control during the same period?

The various telegraph companies transacting business in competition with the Western Union Company own about ten thousand miles of line, and are represented by an aggregate capital of over sixteen million dollars. It is not probable that these companies have earned enough to cover their current expenses, and it is well known that some of them have already incurred debts for a greater amount than their property is worth. There is every reason, therefore, why these concerns should look with favor upon a Government purchase, and I presume that their managers are actively at work to bring about such a result.

It is a fact worthy of mention that although the land lines in Europe are almost exclusively owned by the various Governments through which they extend, the submarine lines, over which all the important communications with Asia, Africa, Australia and America are transmitted, are owned by private companies. The length of the submarine lines now in operation is thirty-six thousand three hundred and two miles, for the construction of which upward of sixty million dollars of private capital has been expended, of which at least one-quarter has been devoted to the construction of cable lines in Europe for the express purpose of avoiding the Government land lines, where important communications were subjected to such serious errors and delays as to render them comparatively useless. One of the most marked instances of this kind was the construction of a submarine line from Falmouth, England, to Malta, a distance of twenty-eight hundred and sixty-four miles, in order to avoid using the Government lines in France. These private submarine telegraph lines can scarcely be overrated in their relation to the commerce of the world. They extend beneath the Atlantic and German oceans, the Baltic, North, Mediterranean, Arabian, China, Japan and Red seas, the Persian Gulf, the Bay of Biscay, the Straits of Gibraltar and Malacca, and the Gulfs of Mexico and St. Lawrence, thus uniting the whole civilized world in one continuous chain of telegraphic lines. Messages from the United States destined for India, China, Japan, or Australia, would not pass over a rod of governmental telegraph line.

Yours respectfully, GEORGE B. PRESCOTT.

Hon. JAMES B. BECK.

PROGRESS OF INVENTION.

No one is able to fix a limit to human ingenuity. Ever since the organization of civil society new plans have been continually multiplying to lessen labor and protect man against man. Labor-saving machines, therefore, have increased so vastly it would be quite impossible to catalogue them. Although it would seem difficult to contrive more complicated locks than are now patronized by banking institutions for the safety of their treasures, there are regiments of rogues at large whose skill in opening them is absolutely superior to that of those who contrived them. If hundreds incarcerated in prison for the crime of burglary were honestly exercising their extraordinary ingenuity in a legitimate way, monuments of mechanical ingenuity, infinitely surpassing any yet seen, would unquestionably be called into existence.

TURKISH TELEGRAPHY.

According to a recent writer, "Telegraphs were introduced in Aleppo, Syria, a few years ago by the Government, and now reach about all the places of any importance; but let not any one suppose that telegraph means the same in Turkey that it does in America. The motto of everybody in this country is "*Yavash, yavash*" (slowly, slowly), and even electricity is handled by these phlegmatic Turks in accordance with their time-honored customs. Electricity is altogether too fast for the average followers of the prophet; but, as it pays no heed to "*yavash, yavash*," after it is started, the Turkish operator delays the message as long as possible at one end, and the Turkish carrier at the other end waits till a quanity of telegrams have accumulated, and then devotes half a day to delivering the arrivals for the week. Let me mention a couple of cases that occurred under my own observation a few days ago. One gentleman telegraphed to Aleppo from Antioch, distant about one hundred miles by telegraph route, and got his answer in just forty-eight hours, though his agent in Aleppo answered immediately."

WEATHER SIGNALS.—The government of New South Wales, following the lead of Europe and the United States, has introduced the system of telegraphing the anticipations of the weather, and has established certain stations on the coast for indicating the nature of any expected storm by means of signal masts. These signal masts support two yards, crossing each other at right angles in the direction of the cardinal points of the compass. A violent squall is to be represented by a conspicuous diamond-shaped signal; a heavy sea by a drum; a gale with clear weather is indicated by a diamond-shaped signal over a drum; and one with thick weather and rain, with the same signal under a drum. The direction in which the wind is blowing is indicated by the particular yard-arm between which and the mast-head the geometrical signal is suspended. Gales that are general over a large portion of the coast are indicated without the mast-head flags, by the geometrical figures.

A GALVANIC PENHOLDER.—To those familiar with patent records, there is no lack of inventions notable, not for their usefulness, but their oddity, and for the misconception of cause and effect shown in devising them. Occasionally one of these may be mentioned as an illustrative example. For instance, a gentleman with a genius as unique as inventive, lately incurred the expense of an English patent for a device for securing steadiness to the hand of a penman by a novel application of galvanism. He makes the penholder of an outer tube of copper and an inner one of zinc; the former being perforated, so that, when grasped by the fingers and thumb in the act of writing, a portion of the inner tube will be brought in contact therewith. The moisture of the skin is expected to induce a gentle voltaic action between the two metals, and this, acting upon the hand, is designed to steady the shaky nerves, and thereby secure comparatively faultless samples of chirography. Ridiculous as this seems, there should be little surprise if, in some cases, the desired result were actually obtained. Imagination has a mighty influence upon the control which people have of muscles, nerves, and tendons, and the man who can persuade himself that his hand is steadied by the mysterious influence from a twopenny galvanic penholder may, perhaps, improve his handwriting as the result of credulity, if not of science.

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REMOVAL AND IMPROVEMENTS IN THE DETROIT OFFICE.

The office of the Western Union Telegraph in Detroit, Mich., has been transferred to Buhl's new block, on the southeast corner of Griswold and Congress streets, and a very handsome and convenient location it is, too. The business office for the reception and delivery of messages is in the basement, to which there are two public entrances, one on Griswold and the other on Congress street. Passing through either of these doors, the visitor finds himself in a nicely lighted and well furnished office, across which is constructed a black walnut counter with glass fronts. The space behind the counter is occupied by the officials, clerks, etc., of the line, and an entrance leads from Congress street to this department. It is provided with all the modern conveniences, including a large vault with one of the Detroit Company's safes. By means of a "Blacksmith's Blowers" messages are propelled through a tube to the operating room with astonishing celerity. The apparatus is simply a rotary air pump. A message is placed in a leather box in the air-tight tube, and three revolutions of the crank, by which the pump is operated, is sufficient to force it in a jiffy to the opening at the top, and there it drops into a wire basket. The box is then emptied and returned to the business office below through another tube. The invention is exceedingly convenient, and is far superior to the old "dummy." The telegraph company occupy the entire top story of the building for various purposes, but their operating room is located in the corner. Running into this department are forty-eight wires, and here thirty-two instruments are kept busily clicking the news from all parts of the world. The room is large, is lighted on two sides, and is supplied with every possible convenience. The instruments and apparatus generally are all of the new and improved patterns, and the institution is supplied with everything that is desirable for the transmission and reception of telegrams from every quarter of the globe that is traversed by telegraph wires. The new headquarters are creditable to the enterprise of the company, as well as to the business community, whose employment of the telegraph makes these extensions of facilities imperative.

THE FIRST IDEA OF THE TELEGRAPHIC DIAL.—In a work written by Father John Laurechon, a Jesuit, printed in 1624, at Pont-à-Mousson, under the title of "Récréation Mathématique composée de plusieurs problèmes plaisants et facétieux," there is to be found a curious passage, well deserving to be quoted:—"It is stated, that by means of a magnet, or any stone of the kind of load-stones, absent persons could communicate with each other; for example, Claudius being in Paris, and John in Rome, if each had a needle rubbed with some stone having the power, as one needle should move in Paris the other could move correspondingly at Rome; Claudius and John could have similar alphabets, and having arranged to communicate at a fixed time every day, when the needle had run three times and a-half round the dial, this would be the signal that Claudius wished to speak to John and to no other. And supposing that Claudius wants to tell John that 'the King is at Paris,' he would move the needle to the letters *t*, *h*, *e*, and so on. The needle of John agreeing with that of Claudius would, of course, move and stop at the same letters, and by such means they could easily understand and correspond with each other. This is a fine invention, but I do not believe there is in the world a loadstone having such a power, and besides it would not be expedient, as then treason would be too frequent and too secret." Father Laurechon used to write under the assumed name of H. Van Etten. Annexed to the passage quoted, there is a diagram of a dial, with the 24 letters, having the needle fixed at the letter A. A similar allusion is to be found in the Dialogue of Galileo.

SAFETY MATCHES.—Casualties are continually occurring from fires caused by ignition from the still burning ends of lighted matches thrown carelessly aside; and it may be of interest to learn that a mode of preparation has lately been devised by which such a result may be entirely prevented. The principle of the new match consists in impregnating the wood of which it is made with a chemical solution which prevents the carbon from remaining a fiery mass for a single instant, as in the case of ordinary matches, so that as soon as it is blown out it may be thrown with perfect safety upon inflammable or explosive substances. The manufacture is said to be no more expensive than of those now in use.

PROBABLE TEMPERATURE OF THE SURFACE OF THE SUN.—An animated discussion has recently been going on in the French Academy of Sciences respecting the probable temperature of the surface of the sun. It was commenced by Pere Secchi, who has experimented on the effect of the solar rays in heating a thermometer. Assuming that the radiation of heat from all bodies is proportional to their temperature above the absolute zero, he finds that the temperature of the sun must be at least *ten million degrees* in order that it may radiate the amount of heat we actually receive from it. The French physicists all take strong ground against this conclusion, and cite the researches of Pouillet, who, by nearly the same method, found that the required temperature was only 1500 degrees, approximately that of the hottest furnaces.

The difference of the results arises partly from the different laws of radiation adopted. Pouillet adopted the law of Dulong and Petit, founded on actual experiments, which showed that the quantity of heat radiated by a body increases in a geometrical ratio, while its temperature rises in arithmetical progression. The French argue that this law, being based on actual experiment, is to be preferred, and Vicaire uses it to derive the solar temperature from the experiments of Secchi, and finds the result to be only 1398 degrees, less than a thousandth part that of Secchi. M. Vicaire's communication was followed by remarks from four members of the Academy, who all coincided with his views. M. Fizeau called attention to his own experiments, which showed that the light of the sun was only twice or three times as bright as the electric light, as proving that the solar temperature could not be many times higher than that which we are able to produce artificially, and which does not exceed three thousand degrees centigrade.

PROGRESS IN MECHANICAL SCIENCE.—The progress in mechanical science is shown by the statement of Dr. Lardner that 480 tons of coal, with an engine and hoisting-machine, would have raised every stone of the Great Pyramid to position. It should be remembered that the Great Pyramid weighs 12,760,000,000 tons, and, according to Herodotus, it took the labor of 100,000 men twenty years to build it.

ELECTRICITY AND NERVE FORCE.—Mr. J. St. Clair Gray, of Glasgow University, Scotland, has recently observed the mutual action of sulphur and phosphorus in alkaline solutions, and the idea that such action might be the source of an electric current occurred to him. Accordingly he prepared a cell containing caustic potash in solution, and placed in it sticks of phosphorus and sulphur; and he found, half an hour afterward, that the sulphur remained unaffected, while the phosphorus had settled in an oily mass to the bottom of the alkaline fluid. Phosphoretted hydrogen, spontaneously inflammable, was given off during the first six days; but after this time the gas became somewhat sulphuretted, and no ignition took place. The test by Sir W. Thomson's electrometer, made by a qualified assistant of that eminent philosopher, showed the electromotive force to be 162, while a Daniell, acting under similar conditions, exhibited 120 only. A remarkable feature of this battery was that the fluid phosphorus on being removed and washed, still retained its liquid shape. Sticks of solid phosphorus were introduced, and they not only did not help the liquor to solidify, but speedily became deliquescent themselves.

Mr. Gray's object was to obtain data to support a theory on the origin of nerve force, he being convinced that the power of the nerves has an electric element in it. He was induced to make the experiment described above by the well known facts that phosphorus is largely present in the brain and sulphur in the liver, and that an alkaline fluid is in constant circulation between them. He has tested this theory by experiments on a rabbit, and considers that he is justified in assuming that his explanation of the existence of galvanic action between the brain and liver is correct and well founded.

TRAVELING STONES.—Many of our readers have doubtless heard of the famous traveling stones of Australia. Similar curiosities have recently been found in Nevada, which are described as almost perfectly round, the majority of them as large as a walnut, and of an irony nature. When distributed about upon the floor, table, or other level surface, within two or three feet of each other, they immediately begun traveling toward a common centre, and there huddled up in a bunch like a lot of eggs in a nest. A single stone, removed to the distance of three and a half feet, upon being released at once started off, with wonderful and somewhat comical celerity, to join its fellows; taken away four or five feet, it remained motionless. They are found in a region that is comparatively level, and is nothing but bare rock. Scattered over this barren region are little basins, from a few feet to a rod or two in diameter, and it is in the bottom of these that the rolling stones are found. They are from the size of a pea to five or six inches in diameter. The cause of these stones rolling together is doubtless to be found in the material of which they are composed, which appears to be loadstone or magnetic iron ore.

Electricity is the comparatively dormant power in nature. However, the philosophers and great inventors are on the scent. It is a force they are determined to utilize. Steam may give way to it even in this generation. It runs sewing-machines to-day, but the child is born who may see cars running at a fearful speed by that same agency. It is a motive power Nature employs in conducting the grandest operations in the heaven above and the world below.

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REMONSTRANCE OF THE WESTERN UNION TELEGRAPH COMPANY AGAINST THE POSTAL TELEGRAPH BILL.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, February 13, 1872.

To the Honorable the Senate of the United States:

The Western Union Telegraph Company hereby respectfully remonstrates against the passage of Senate Bill No. 341, entitled, "A Bill to Connect the Telegraph with the Postal Service, and to Reduce the Rates of Correspondence by Telegraph," reported by the Senate Committee on Post-offices and Post-roads (Report No. 20), January 22d, 1872.

The following are some of the objections which we urge to the bill:

First.—Although the Report truly states that "the Western Union Telegraph Company performs nine-tenths of the telegraph business, and fairly represents the telegraphing system of the country," this Company has not been applied to by your Committee for any information either concerning its own business, or in relation to telegraphy generally; nor has it been offered an opportunity to be heard upon the subject before the Committee. On a single occasion, two years ago, the President of this Company was, on his own application, accorded a hearing before the Committee, limited to fifteen minutes.

Under these circumstances, the Managers of this Company have been much surprised at the publication, in a Senate document, of statements concerning this Company which are erroneous in fact, or in the inferences to be established, and which are used to justify the very extraordinary measures embraced in this bill.

This Company is not prepared to admit that the Senate of the United States is the proper tribunal before which to try corporations created by the States, either for alleged undue expansion of capital, unreasonable charges, or inadequate facilities; but we claim that, whether the measure reported by the Committee on Post-offices and Post-roads is based upon charges against this Company, or upon alleged considerations of public policy, the dictates of justice and the practice of the Senate, alike require an inquiry into the facts, and a careful investigation of the interests to be affected, before adopting legislation so important in its consequences. Representing, as this Company does in a large degree, the telegraph property, the telegraph experience and the telegraph progress of the country, we claim that, in any proposed legislation affecting telegraph property and business so vitally as the provisions of this bill, we are entitled to a hearing, both as to the necessity alleged to exist for Congressional action, and the effect of such action upon the private property involved.

We protest against the assumption of the Committee of the Senate, without proof and without having been heard in our defence, that the business of the Western Union Telegraph Company is conducted in disregard of the rights of the public to such an extent as to render it necessary for Congress to intervene. We are not advised that any person has applied to the Senate for the redress of any grievance alleged against this Company. Its Managers are believed to possess the confidence of the public, and are earnestly striving to meet their wants by extending their lines into new territory, and by enlarging telegraphic facilities as rapidly as the growth of business demands. The telegraphic facilities of the United States have been increased within less than six years past by the construction of thirty thousand miles of line and seventy thousand miles of wire, and the opening of more than three thousand new stations. Of this development the WESTERN UNION COMPANY has provided more than half, and has expended therefor about five million dollars, in addition to the contributions of Railway Companies included in its system, which amount to two and a half million dollars more. Probably the gross expenditure for new telegraph property by all the companies in the country, including railways, has amounted to nearly or quite, twelve millions of dollars within these six years. During this period the average charge for messages has been reduced one half, and work has been in progress for some time by this Company preparatory to further reductions, which will be made at an early day.

There have been paid in dividends to stockholders in telegraph companies, during the period of this development, about five millions of dollars, or an average of less than one million a year. This would be ten per cent.—the rate contemplated by this bill—on a capital of ten millions, which is less than the sum invested during the same time in extending and improving the telegraph system, which previously represented more lines and larger revenues than those for which Great Britain recently paid more than thirty million dollars in gold. That the capital invested in telegraphs in the United States is not now, and has not of late been receiving adequate compensation, is well known to all who are acquainted with the facts. The investment has been made, however, in the confident expectation of a suitable return as the country progressed in population and wealth. This Company has considered the ordinary risks incident to competing enterprises, where success depends on the patronage of the public, but they have wholly overlooked the possibility of danger from the Government, or of an attempt by Congress either to take their property or interfere with their business without just compensation, or to create a competing company, and then to confer upon that company the right of the exclusive use of the vast facilities provided for the postal service at the public expense.

Private enterprise has already established the telegraph throughout every State in the Union, and in all the territories but one (Arizona). The value of the services it has rendered, without charge in the interest of science, and to sufferers by fire, and flood, and pestilence, is far beyond that of all the pecuniary contributions it has received. Millions of acres of the public domain have been granted to railway corporations, while the telegraph has received no grants of land except whereon to plant its poles.

While the deficiency—nearly $25,000,000—in the revenues of the Post-office Department within the last five years has been defrayed by taxation upon the people, the extensions of the telegraph within the same period have been made by means of private capital, furnished by private citizens. This bill attacks the results of this enterprise, and, if it becomes a law, will be fatal to them.

Second.—This bill creates a corporation and confers upon the corporators special privileges and extraordinary powers. *Upon what principle, and for what reason the particular persons named in this bill are proposed to be made the recipients of a franchise never granted by Congress before, and of immense pecuniary value, in the event that they shall be enabled, under cover of its provisions, to grasp the telegraph property of the corporations created by the States, and now engaged in the business, we are not informed.* They are authorized to issue one million dollars of its stock "for expenses of organization," and as there is nothing in the bill to prevent the distribution of this stock among the corporators, we assume that to be their expectation. The bill contains no provision requiring the contribution of any money as the basis for the issue of such stock. The stock is entitled to receive dividends at the rate of ten per cent. per annum, so that Congress is, in effect, imposing a tax of one hundred thousand dollars a year, to be levied either upon the Post-offices or the senders of messages, to give a bonus to the beneficiaries under this bill, as an inducement to engage in a business in which they have now no investment, and in the conduct of which they have had no experience. If it be the policy of the Government to give so large a bonus to encourage investments in telegraphic enterprise, we submit that justice requires that companies now engaged in the business, and whose property is at hazard, shall at least be permitted to compete for the gift.

Third.—The bill provides that certain expenses, heretofore borne by telegraph companies, such as rent, lights, fuel, messenger and clerical services, and also for stamps, shall hereafter be borne by the Post-office department—the inference being that the necessary labor can be performed without increasing either the number of officials or the expenses of the department, and that it is on account of the saving thus effected that the telegraphic service can be performed by the corporation created by the bill at rates which all past experience in this country has found to be unprofitable. The fact that this illusive feature has escaped the scrutiny of the Committee on Post-offices and Post-roads is another evidence of the injustice of acting on the bill without subjecting its provisions to the criticisms of interested and competent experts. The bill provides for a class of messages (section 2) termed "registered telegrams," "which shall have priority of transmission," and on which double rates may be charged. On examining the Report of the Committee, to ascertain the reason for conferring a privilege of such immense value, we find no reference made to the subject.

This Company remonstrates against a scheme which gives a million dollars to create a new monopoly, under the pretence of checking an existing one, and which, under the plea of effecting "a greater reduction of rates than was obtained in Great Britain," covertly authorizes putting aside the ordinary messages of the public, whatever the pressure of their necessities, and giving up the wires to priority messages at double rates—the effect of which must inevitably be to establish the priority rates for all messages requiring immediate despatch. The priority rates under this bill are higher than the present average rate.

We remonstrate against the passage of a bill which proposes to hire out the Government Post-offices, furnished, and warmed, and lighted, and the services of Government *employes* to private parties, unless to the highest and most responsible bidder. Especially do we protest against being excluded from such competition, and being put on the defensive by those whose investments in the business will be made, if made at all, after they have realized from the gratuities which the bill proposes to confer.

Fourth.—The bill, in effect, exempts the property and business of the Company which it creates from State and municipal taxation. It also makes the Company the agent of the United States; so tha

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the public would be as completely without redress, in case of neglect to forward and deliver messages, as they now are for the loss of registered letters and other valuables entrusted to the mails; at the same time all the risks of defalcations by postmasters and clerks, of theft or counterfeiting of stamps, are thrown upon the Post-office Department.

The Western Union Telegraph Company does not desire that the Government shall purchase their property. It has confidence in the future growth of the country in population, commerce and wealth. In the benefits of that growth the telegraph must largely participate. It relies upon the future for a just return for the great expenditure it has already made, and is still making, to enlarge and improve its service. If, however, this Company fails to meet the just expectations of the public, it is suggested that the true remedy is to require the surrender of its property, under the conditions of the law of 1866. But, until a state of things exists which makes interference by the Government necessary for the protection of public interests, this Company asks to be permitted to control and conduct its own business without Congressional intervention.

We remonstrate against the passage of this bill, because it would depreciate the value of the Company's property for the benefit of private parties. It cannot be that Congress would enact a law, the necessary and direct effect of which would be to depreciate the value of private property, which they have the right to purchase with a view to diminish the compensation to be paid therefor.

When the Company accepted the provisions of the Act of 1866, it was upon the assumption that a compact was thereby entered into between the Government and the Company—(1), that we were not to be interfered with by Congress until the expiration of five years; and (2), that thereafter we were only to be liable to be dispossessed of our property at a valuation to be fixed by arbitrators in whose appointment we should have an equal voice. This Company submits to the Senate whether the enactment of such a law as that reported by the Committee would not be a violation of the compact into which we entered, relying upon the good faith of Congress. Under that compact we are to-day transmitting messages for every department of the Government, giving them priority over all other business, at rates fixed by the Postmaster-General, which do not pay us for the cost of the service. Is it unreasonable in us to ask, as we now do, either that the compact be performed on the part of the Government or that this Company be released from its obligations?

Common justice requires that if Congress is to establish a competing enterprise, in which the Government is to be the active and only responsible partner, it shall leave this Company untrammelled by the restraints of a compact whose reciprocal conditions it wholly disregards.

The owners of telegraph property would be justified in petitioning Congress for relief from many of the burdens it is obliged to bear; but this Company asks nothing except a thorough investigation of the subject, at which they shall be permitted to answer any charges affecting their administration, and that they be allowed also an equitable participation in whatever privileges are offered by Congress with a view to making cheaper telegraphy possible.

The Western Union Telegraph Company relies upon Congress to protect their property from a scheme which, while it pretends to promise desirable reforms, and provides a princely bonus ostensibly to secure them, makes no provision either for compensation to the owners for private property virtually destroyed, nor for securing to the public any of the benefits promised them. We are unable to regard it otherwise than as a scheme to enrich its promoters at the expense of the public treasury, and of the private interests which it seeks to supplant.

WILLIAM ORTON,
HORACE F. CLARK,
E. D. MORGAN,
MOSES TAYLOR,
ALONZO B. CORNELL,
AUGUSTUS SCHELL,

Committee of the Board of Directors of the Western Union Telegraph Company.

CORRESPONDENCE.

RANDOLPH'S TELEGRAPH INSTITUTE.

NEW YORK, May 10, 1872.

To the Editor of the Journal of the Telegraph:

In establishing my Institute of Telegraphy in this city, with an experience of fourteen years as a practical operator, I can assure my patrons that they will receive advantages never before taught in a school of telegraphy.

My scholars will practice with the relay and local sounder, and not with the sounder alone, as is usual in all other schools.

The advantages are apparent to any practical operator. My wires and desks are so arranged as to make them represent a telegraph line and offices. By means of artificial appliances the various changes common to telegraph lines will be exemplified, and the student will receive information in this respect which is fully as important as the mere manipulation of the key in forming the alphabet, and without the knowledge of which would often times be unable to work themselves and prevent others from working.

I am authorized by the officers the W. U. Tel. Co. to state that all persons becoming my pupils, and who may creditably pass a board of examination, appointed by the above company, shall receive positions as operators, if at that time a vacancy should exist.

Very respectfully, K. S. V. RANDOLPH.

COUNTING FIGURES, IN DUPLICATE.

CORINNE, UTAH, April 22, 1872.

To the Editor of the Journal of the Telegraph:

Please inform us through the JOURNAL, how, according to the rules of the Western Union Company, "Twenty thousand dollars (20,000)" is counted.

It is contended that as the figures come *after* the word "dollars" they represent "twenty thousand dollars" and should be counted three words, making six words in all. H. *vs.* G.

Answer.—In counting figures in duplicate of words, the figures are to be counted as they are expressed in words. It is clear that "dollars" is not part of the figure, but is an article of which there are twenty thousand, in the sense given.

TRAIN DISPATCHING BY DOUBLE ORDERS.

XENIA, Ohio, May 7, 1872.

To the Editor of The Journal of the Telegraph:

As I notice considerable controversy in the JOURNAL of late, on the subject of "Train Orders," some correspondents claiming that it was impossible to use *double* orders in *all* cases, I take the liberty of sending you a circular, showing the system as at present used on this Division, which certainly covers *all* the contested ground. The system has been in use on the P. F. W. & C. Railway for years and is also in use on the Pittsburgh Division of this Railway. A. T. LEE,

Night Train Dispatcher, L. M. Division.

The first rule of the circular referred to by our correspondent, reads as follows:

"1. All special orders by telegraph for the movement of trains will be given in writing, addressed to the conductor. The conductor shall sign his name to the original order as written by the operator, who shall repeat it back, with the conductor's signature, with the prefix 'I 13,' to the office from which the order was received. The person sending the order will respond 'Correct,' followed by the exact time, which shall be endorsed on the order. The operator shall then make two copies of the order, adding thereto the reply 'Correct,' and the time following it, both of which copies shall be given to the conductor, who shall see that they are exact copies of the order signed by him, and hand one to the engineer. Both copies shall be signed by the operator.

Any engineer leaving a station under special orders, without a copy of the order in his possession, will be held personally responsible for all damage that may result therefrom."

DIRECT YOUR LETTERS PLAINLY.

BELVIDERE, N. J., May 10.

To the Editor of the Journal of the Telegraph:

Would it not be well to give notice through your columns that offices having error sheets between Belvidere, N. J., and Belvidere, N. Y., and also Ill., to have them plainly directed, as often letters belonging to Belvidere, N. Y., come to me and are opened before noticing the mistake, thus making extra postage. I have just received three belonging to Belvidere, N. Y., and have to forward them.

Respectfully, S. TUCKER, Manager.

THAT COLORED STUDENT.

ALTON, Ill., May 7, 1872.

To the Editor of the Journal of the Telegraph:

Do you think the operator who published in the JOURNAL of April 1 that I was instructing a young colored gentleman in the mysteries of the art, can meet me hereafter without compunctions of conscience for telling such a malicious and deliberate falsehood?

Yours truly, S. T. BAYLIES, Manager.

STUDENT, at Augusta, Ga., is informed that a person of quick perceptions is usually qualified for the business. That it requires perseverance and assiduity to excel. From three to five years constant application would probably bring him to the point known as first class Good operators are always in demand. Salaries vary, according to location, and position. Handwriting fair.

EX. OPR. at Tarboro, N. C., is informed that *good* operators are always in demand, in every section of the country. The market is over-stocked with the inferior article.

ONE OF THEM, at Detroit, will please accept our thanks for his attention. We already had the matter from another source.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, MAY 15, 1872.

SALUTATORY.

It is with extreme diffidence that the undersigned takes up the pen just laid down by his predecessor, and, with it, the duties and responsibilities imposed upon him by the kindness, and, perhaps, partiality of his superior officers.

The kindly feeling and geniality which the late Editor of this paper possesses in so remarkable a degree, and the universal feeling of friendship borne toward him by the fraternity at large, will tend to render the path of the present Editor the more arduous and difficult.

Under these circumstances, much should not be expected of him—certainly not at the present time. He has had but little experience, other than occasionally contributing to the columns of the daily Press.

Fresh from the ranks of the active toilers at the key and pen, he believes that he is familiar with their feelings, and is desirous that in the columns of the JOURNAL these feelings shall find vent; that not only shall this be regarded as the official organ of the Western Union Telegraph Company, but that it shall also be the organ of all employed by the Company.

The occupant of this easy chair finds it "easy" only so far as the seat is concerned, for there is plenty of work to be done, there being no place for idlers in the ranks of the Western Union Company.

If, when he lays down his pen and vacates the chair for some one more competent or more worthy, he shall receive only a tithe of the praise and evidences of good feeling, not only from his employers, but from all ranks in this noble profession, that has fallen upon the retiring Editor, his efforts will not have been in vain.

F. J. GRACE.

We would call attention to the advertisement of Mr. K. S. V. Randolph, in another column of this paper. Also to his communication in explanation of the special advantages enuring to the graduates of his institute.

Mr. Randolph is a capable operator, and has had considerable experience as a teacher. Those desirous of becoming telegraphers cannot do better than to enter into a few courses of study with him.

THE JOURNAL OF THE TELEGRAPH AND ITS AIMS.

During the latter part of the year 1867 the publication of the JOURNAL OF THE TELEGRAPH, in its present form, was resolved upon by the Western Union Telegraph Company, for three principal reasons:

First: That it should be the medium through which the various orders and changes, which, from time to time, became necessary in conducting the service, should reach those whose duty it was to carry them out.

Second: That it should indicate, to those interested, the general policy of the Company; and,

Third: That it should be the means of imparting knowledge and education in the art, to those in need of such instruction. The wisdom which resolved upon this publication is apparent.

Embraced in the general policy of the Company was the recognition of the fact that a perfect and just understanding between the officers and their employes was, in the highest degree, essential to the welfare of both.

Owing to a combination of unfavorable circumstances this understanding is not yet as perfect as it is desirable it should be. The mass of employes do not exhibit that perfect confidence in the Company which the Company deserve at their hands, and which they so greatly desire.

It is our mission to lay these facts and assurances before the operators of the country, and to ask their assistance and co-operation in securing the benefits to arise.

The Company desires to elevate the service. It is already equal to any, and superior to most, in intellectual ability. It can be carried still higher, but not while there are divided counsels. Every intelligent thinker must see that there is more in the business than a mere livelihood; that there are honors and emoluments, in the near future, for the deserving.

The business of the telegraph, under the auspices of the Western Union Company, has assumed such proportions that it is a power in the land, wielding a moral force which can be made irresistible. Every one connected with the business, from the highest to the lowest, has his part to perform. With the whole body a unit, one homogeneous phalanx, what limit can be set to their progress—the progress of mind? Each step taken in advance will be an advance of the entire body, and not of any individual portion.

In order to arrive at this position a mutual interchange of thoughts and ideas is of paramount importance, and there is no channel so appropriate for this purpose as the columns of this paper. Its columns are open to all. Suggestions from practical men are desired. Criticisms will be welcomed.

A standing rule of the Company requires that every one in its service should communicate, whenever in his judgment it seems necessary, any operation of a promulgated order, prejudicial to the interest of the Company. An operator's service is not complete with simply making and translating dots and dashes. The Company claims the benefit of the working of his mind, as well as that of his hand. And here it is that a superior mind attains its proper level. The earnest and thoughtful rise above the superficial, in their rise carrying the whole body a step forward. Honor will be given where honor is due.

Let us take the first step to this end. In the effort many will rise; many will remain, waiting only for another opportunity. Those, only, who lack the ability or the energy to keep in the race, will not find their condition improved. These will soon, from the force of circumstances, drop off, allowing the ranks to be more firmly closed, and the field for ambition enlarged.

A fruitful source of discord has its germ in the over-sensitiveness of many minds. Men sometimes imagine that they have been aggrieved; that they are oppressed by a superior officer. It is just possible that they may be correct.

Now, consider the proper means to place matters right and to secure justice. Is it to nurse an internal sulkiness; to retaliate by taking no interest in the business entrusted to them, or by any of the many ways in which retaliation is possible? Many take this course, not reflecting that such retaliation recoils upon themselves in the violence done to their own manhood—in the injury they inflict upon the *morale* of the *corps* and the direct injustice to the Company, which, probably, was not a party to the oppression, if oppression really existed outside of the sufferer's imagination. Some bolder spirit would, under similar circumstances, rush into print, in a quarter, where, owing to his diseased imagination, he derives comfort from a false sympathy. But in neither case is justice arrived at. One result, however, will have been attained; the whole body will have taken a step backward.

Would it not be better, if, instead of the course we have depicted, the aggrieved party should, if he cannot bring himself to the point where a personal explanation could be reached, communicate his cause of complaint to the JOURNAL, and thus, perhaps, in a friendly way, an apparent wrong might be made right. None need be apprehensive that confidence will be betrayed. If oppression really exists, there is a remedy, and the remedy will be justly applied, but there is no way to secure it other than the course we suggest.

Let it be understood, however, that we do not invite captious complaints, nor do we wish that our suggestions should be the means of fostering a state of chronic fault finding. Our chief desire is to second the aims of the officers of the Company in elevating the service, and to impress the truth, that the interest of employer and employé are identical; and when the JOURNAL becomes fully that for which it was established, the voice, not of one branch only, but of all connected therewith, the first step in accomplishing the desired result will have been taken. To this end we invite the hearty co-operation of all who, by advancing the interests of the service thereby promote their own.

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REASONS WHY ALL TELEGRAPHERS SHOULD SUSTAIN THE JOURNAL OF THE TELEGRAPH.

Because it is a first-class journal, especially adapted, in its reading matter, to the wants of those interested in its speciality.

Because it is a handsomely-printed sheet, at all times with twenty-four, and occasionally with thirty columns of interesting matter.

Because it will, from time to time, contain instructive and entertaining articles upon the science pertaining to telegraphy, from the pens of leading scientists, both in this country and in Europe.

Because its columns are open to all to ventilate abuses and to suggest reforms.

Because it is at all times willing and anxious to impart information in the line of the profession, and there is none more competent.

Because, with all these advantages, its subscription price is so low—barely meeting the cost of the paper upon which it is printed.

TO OUR SUBSCRIBERS.

In examining the subscription list of this paper, we find that many of its nominally paying subscribers are greatly in arrears. The paper is honestly worth more to any telegrapher than the price charged for it, and the amount is so small that it is within the means of all.

In this view, is it not inexpressibly mean for any person to continue receiving the paper without remitting its subscription price?

The number of backward subscribers is so large that we cannot undertake to present a bill to each one, so we here appeal to every one knowing himself to be in arrears to settle up for the past, and subscribe for the present and future volumes.

As the rate of subscription is invariably payable in advance, the JOURNAL, after the present number, will be sent to those only who have complied with its terms.

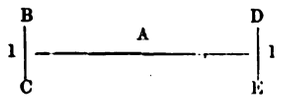
WE are pleased to hear of the appointment of Mr. W. H. Sawyer, as General Superintendent of the American District Telegraph Company.

Mr. Sawyer is in every way qualified for the position. His appointment is another exemplification of the reward which surely follows merit and faithful performance of duty.

WILL water burn? And if so, can burning water be used at a moderate cost for fuel? The public mind of Peoria, Ill., has been of late much exercised upon these questions. A stranger and a Yankee came to the city and claimed that, by burning mixed water and oil in it, he could heat a common cooking stove red-hot in five minutes. The proportions were four gallons of oil to five gallons of water, and with this quantity the inventor declared that he could run a steam-engine for thirty days, heat twelve furnaces, or light a whole city with gas. The oil was worth fifty cents a barrel, and cooking, heating and lighting were thus to cost almost nothing. A stock company was started to push the enterprise, and it was found that, "by the aid of twelve gallons of oil, two gallons of water could be evaporated." It didn't promise overwhelming dividends. The corporation disembodied itself as fast as possible, and the inventor, packing up his gas-pipes and oil-cans, left Peoria to enlighten and warm some other region.

This almost equals Paine's "Water Gas" and his latest exploit in electro-motives. He had better look to his laurels.

DOUBLE TRANSMITTER.—The Western Union Telegraph Company has acquired the exclusive ownership of the patents of 1868 of Joseph B. Stearns, of Boston, Mass., for instruments by which telegraph messages are transmitted in opposite directions by the use of a single wire. This improvement is one of the most important that has been made in connection with telegraphy. Many of the Stearns instruments are now in use, and the Western Union Company is introducing them upon its lines as fast as they can be manufactured. The importance of the invention will be understood when we state that it practically doubles the transmitting capacity of every telegraph wire owned by the company. Let none of our readers suppose that the chimera of "sending two currents in opposite directions on the same wire" has been realized in this invention. Not that; but its practical equivalent is realized, to wit: Two messages are transmitted simultaneously in opposite directions by means of one wire while the electrical current is always moving in one circuit, in the usual manner. How it is done we tell by means of this simple diagram:



A is the wire stretched between the two places, say New York and Boston; 1—1 the tables on which are the instruments in the offices at either end of the line; B the receiving instrument at New York; C the sending instrument do.; D the sending instrument, and E the receiving instrument in the office at Boston. A sending and a receiving operator sit at the opposite ends of the same table in each office, and from each instrument—four in all—a ground wire descends to the earth, thus making two complete circuits over the single line. The operator at B pays no attention to what his co-laborer at C is doing, but sends right through to D, and at the same time E is sending to C, or *vice versa*, neither interfering with the other in any manner.

We shall, on a future occasion, probably illustrate and fully describe this marvel in telegraphy.

ELECTRIC EARTHQUAKES.—A frantic scientist has discovered at last the cause of California's shocking earthquakes. It is all the fault of the mineral belts constituting the slopes of the Sierra Nevada. Iron predominates in all these belts, and as iron is the most obliging conductor of electricity, they become in the dry season immense reservoirs of confined negative electricity. Dry air being a non-conductor, all this force gets no chance for equalization with the air current, hence, when it becomes crowded, it bursts out with tremendous impetuosity. To check this agitating performance, our savant advises the use of iron conductors. The trembling Californians listen kindly, and lonely horsemen, winding down the great hills of the Sierra Nevada range, may presently prepare to see them surrounded by an expensive and bristling fence of lightning-rods.

BORN.

GRIFFEN.—April 20th, 1872, to F. P. Griffen, Manager W. U. Telegraph Office, Upper Sandusky, O.; a daughter.

VANAKIN.—To L. S. Vanakin, Manager W. U. and Erie Railway Telegraph Office, Lackawaxen, Pa.: a son.

SMITH.—May 2, 1872, to Robert H. Smith, W. U. Telegraph Office, Baltimore, Md.; a son.

MARRIED.

BOLDON—COFFEE.—At Visalia, Cal., April 18, 1872, by the Rev. Mr. Kinkade, J. J. F. Boldon, Manager of the W. U. Telegraph Office, Emigrant Gap, to Miss Matilda N. Coffee.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
May 15, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since May 1, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

* Beatrice, Neb.,	500 Mexia, Texas,
863 Byram, Miss.,	866 No. McGregor, Iowa, Heretofore an other line office.
448 Carthage, Mo.,	
428 Concordia, Mo.,	
337 Cornland, Ill.,	299 Perrysville, Ind.,
* De Witt, Neb.,	201 Port Clinton, O.,
Greensboro, Ga., reopened,	* Shelby Iron Works, Ala.,
366 Harpers Ferry, Iowa,	18 So. Weymouth, Mass.,
437 Higginsville, Mo.,	384 Tangipahoa, La., re-opened.
366 Lansing, Iowa,	363 Terry, Miss., re-opened.
299 Montezuma, Ind.,	

NEW OFFICES ON OTHER LINES.

Beatrice, Neb.,	105	7	Plattsmouth, Neb.,
DeWitt, Neb.,	95	7	" "
Shelby Iron Works, Ala.,	50	5	Columbia. Ala,,

OFFICES CLOSED.

Barclay, Ill., Brandon, Miss., Cash-Up, Pa., Harmsburg, Pa., Maywood, Ill., and Weaverton, Md.

GENERAL INFORMATION.

Letters for the following offices should be mailed as indicated herewith:

Aqueduct, Pa.,	Duncannon Co., Pa., P. O.
Eagle, Pa,	Spread Eagle, Chester Co., Pa., P. O.
Bigler, Pa.,	Williamsgrove, Clearfield Co., Pa., P. O.
Julian, Pa.,	Julian Furnace, Pa., P. O.
Mifflin, Pa.,	Paterson, Juniata Co., Pa., P. O.
Osceola, Pa.,	Osceola Mills, Pa., P. O.
Perrysville, Pa.	Port Royal, Juniata Co., Pa., P. O.
Petersburg, Pa.,	Shavars Creek, Huntington Co., Pa., P. O.
Rockville, Pa.,	Susquehana, Dauphin Co., Pa., P. O.
Sandy Ridge, Pa.,	Powelton Centre Co., Pa., P. O.
Snow Shoe Intersection, Pa.,	Milesburg, Pa., P. O.
Steamboat, Pa.,	Glenlock, Chester Co., Pa., P. O.
West Chester Intersection, Pa.,	Paoli, Co., Pa., P. O.

The name of the office heretofore known as Chapmans Creek, Kansas, has been changed to Chapmans, Ks., and that of Harlem, Cook Co., Ill., changed to Oak Park, Ill.

Hereafter the "Tariff for other lines" to Clam Lake, Mich., will be 65 and 4, and to Leroy, Mich., 55 and 4 from Grand Rapids, Mich.

Offices which have recently received new rates to Pittsburgh, Pa., will charge 15 cents more than Pittsburgh, Pa., for tariff to Birmingham, Pa.

WILLIAM ORTON, Pres't.

TRANSFER SERVCE.

EXECUTIVE OFFICE,
NEW YORK, May 15th, 1872.

The following changes will be made in the list of transfer offices on May 20th, 1872:

New Transfer Offices Opened.

Mount Carmel, Pa.—D. H. Bates.
Schuylkill Haven, Pa.— do.

Transfer Office Closed.

Meridian, Miss.—J. B. Tree.

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THE SERVICE.

WESTERN UNION TELEGRAPH CO.

FEBRUARY, 1872.

Appointments.

Name.	*Place.*
OPERATORS.	
Miss Josie A. Cooke	Cooper Union, New York.
A. Davis	Gen'l Operating Dept., "
Miss Maud Harris	City Dept, "
Miss A. B. Hibbard	" "
J. C. Lane	Sag Harbor, L. I.
Miss P. A. Lewis	City Department, New York.
R. A. Myers	Gen'l Operating Dep't, "
R. D. Williams	" "
G. A. Parker	Hantsport, Nova Scotia.
J. McDonald	Pugwash, "
D. A. Story	Richmond, "
M. L. Campbell	Sackville, New Brunswick
A. H. Currier	Contoocook New Hampshire.
C. L. Fay	Marlboro, Massachusetts.
G. W. Metcalf	Richmond, Vermont.
H. R. Stoughton	West Randolph, "
Miss A. R. Carley	Franklin, Massachusetts.
Thos. Farrell	Norwich, Connecticut.
Miss S. C. Holmes	Putnam, "
J. C. Bouton	Rye, New York.
Mrs. C. A. Fox	South Framingham, Massachusetts.
Miss M. S. Thayer	South Dedham, "
H. B. Winchell	Winsted, (C. W. R. R. Depot) Connecticut.
T. Bishop	31 State street, Boston.
J. A. Gay	Amenia, New York.
J. Burton, Jr	Johnstown, New York.
J. F. Morrison	Baltimore, Maryland.
M. Maitland	Bordentown, New Jersey.
J. F. Klugh	High Spire, Pennsylvania.
J. S. Walton	Holmesburg Junction, "
D. H. Rodney	Newport, Delaware.
J. H. Swenk	Sunbury, Pennsylvania.
Mrs. Steelman	Somers Point, New Jersey.
J. R. Mills	Trenton, "
A. G. Johnson	Washington, D. C.
W. D. Garrison	Wilkesbarre, Pennsylvania.
M. Brick	Binghamton, New York.
D. E. Smith	Florida, "
J. B. Berthoff	Jersey City, New Jersey.
C. W. Skinner	Owego, New York.
J. G. Horton	Pine Island, "

Resignations and Dismissals.

MANAGER.	
A. R. Sayre	Washington Market, "
OPERATORS.	
M. Brick	Gen'l Operating Dept., New York.
E. C. Cooke	" "
E. A. Leslie	" "
H. Manwaring	Sag Harbor, Long Island.
E. C. Stockwell	21 Wall street, New York.
R. A. Griffin	Sixth avenue, "
Miss L. Murphy	City Dept., "
OPERATORS.	
H. F. Thurber	Gen'l Operating Dept., "
G. H. Yeaton	Hantsport, Nova Scotia.
C. L. McArthur	Sackville, New Brunswick.
R. W. Holdsworth	Windsor Junc., Nova Scotia.
S. C. Davis	Contoocook, New Hampshire.
B. J. Andrews	Richmond, Vermont.
C. M. Walker	West Randolph, "
Miss N. H. Avery	Putnam, Connecticut.
C. K. Lawrence	Rye, New York.
E. B. Jordan	South Braintree, Massachusetts
Miss M. A. Gay	South Framingham, "
Miss E. W. Stone	Uxbridge, "
J. P. Munroe	Worcester, "
H. H. Becker	Amenia, New York.
Miss L. Burton	Johnstown, "
J. W. English	Rochester, "
D. H. Rodney	Westover, Maryland.
J. E. Spurrier	Baltimore, "
Miss Bella Rest	" "
E. S. Ely	Dover, New Jersey.
W. C. Frick	Hazleton, Pennsylvania.
W. L. Roth	High Spire, "
D. W. Callanan	Holmesburg Junc., "
A. Winlack	New Philadelphia, "
A. P. Fegley	Port Clinton, "
J. A. Hesser	Pottsville, "
J. P. Keene	Philadelphia, "
T. A. Murdock	Sunbury, "
J. R James	Trenton, New Jersey.
J. M. Gassaway	Washington, District Columbia.
E. B. Canfield	" "

TELEGRAPHERS INSURANCE ASSOCIATION.

The acknowledgment of receipt on any one assessment is to be understood as an acknowledgment for all previous assessments. The lists given below include all received by the Secretary up to May 7th :

RECEIVED ON ASSESSMENT NOS. 26 AND 27.

22 71 182 189 190 191 193 198 200 388 389
428 429 456 494 495 496 497 499 500 503 504
505 506 507 561 692 778 977 1104 1150 1287 1288
1417 1418 1447

RECEIVED ON ASSESSMENT NO. 28.

59 312 656 825 1024 1040 1155 1156 1157 1158 1159
1160 1162 1185 1429

RECEIVED ON ASSESSMENT NOS. 28 AND 29.

19 27 30 36 69 74 83 89 97 98 100
108 111 114 122 129 138 141 142 143 144 150
154 156 158 160 162 164 166 171 172 185 186
187 213 228 238 240 242 246 248 253 255 256
258 267 273 278 279 281 282 285 285 288 294
298 319 342 347 354 359 360 362 364 366 379
382 392 393 394 398 418 430 431 433 438 441
447 451 453 455 457 466 468 469 470 474 475
481 482 483 485 514 520 527 528 533 554 565
573 574 584 605 615 616 617 619 627 628 630
648 660 676 678 679 680 684 695 697 700 701
704 705 710 717 723 724 725 728 730 732 733
743 744 750 751 756 758 773 775 780 790 798
799 800 801 809 813 817 823 831 850 869 871
876 880 896 897 899 908 911 912 918 927 930
931 942 946 949 954 955 956 957 958 959 960
963 964 980 990 1019 1025 1028 1030 1031 1032 1033
1034 1041 1042 1043 1050 1059 1071 1072 1080 1084 1091
1102 1103 1133 1134 1135 1136 1137 1159 1153 1163 1164
1179 1181 1187 1196 1200 1208 1210 1215 1216 1220 1223
1224 1226 1227 1234 1235 1237 1238 1239 1242 1244 1246
1247 1262 1268 1268½ 1269 1270 1274 1275 1278 1279 1289
1290 1295 1296 1328 1329 1333 1335 1338 1339 1340 1341
1342 1343 1344 1345 1346 1348 1349 1350 1351 1354 1360
1366 1367 1369 1375 1380 1381 1385 1387 1388 1389 1390
1391 1393 1396 1400 1406 1407 1408 1415 1421 1422 1423
1425 1426 1427 1428 1443 1444 1448 1449 1450 1457 1458
1469 1489 1492 1499 1505 1509

ASSESSMENT 30.

4 16 23 30 41 42 44 46 52 54 55
60 77 78 86 88 90 91 99 101 103 113
129 131 133 145 157 181 183 192 199 208 210
218 228 231 235 245 254½ 269 273 274 276 278
279 281 282 283 285 291 301 319 342 349 351
352 353 378 379 380 383 385 391 405 413 414
420 426 454 478 483 510 520 533 543 546 547
549 553 562 566 615 629 632 642 661 663 669
670 671 672 676 678 679 680 685 702 703 715
721 723 729 731 734 740 758 769 772 775 776
780 791 797 798 799 804 812 820 821 822 830
850 874 875 901 906 918 931 938 939 945 959
978 1000 1001 1009 1011 1013 1019 1023 1029 1039 1043
1046 1047 1054 1057 1066 1073 1074 1075 1076 1087 1088
1090 1111 1123 1139 1142 1143 1144 1147 1149 1163 1165
1168 1170 1173 1174 1175 1182 1183 1200 1219 1213 1220
1222 1224 1225 1228 1229 1232 1245 1254 1258 1259 1260
1261 1263 1267 1271 1275 1276 1277 1282 1289 1290 1292
1298 1300 1303 1304 1306 1325 1327 1329 1334 1358 1359
1360 1367 1368 1375 1376 1394 1398 1409 1413 1424 1440
1451 1452 1453 1454 1455 1456 1459 1479 1481 1482 1484
1485 1486 1487 1488 1490 1492 1494 1495 1496 1497 1498
1503 1504 1506 1507

OCEAN TELEGRAPH.—The Great Western Telegraph company, which intends laying a telegraph cable from New York to England, by way of Bermuda, has paid the Messrs. Hooper, who are manufacturing their cable, the first instalment of £100,000.

Telegraphers'

Mutual Life Insurance Association.

INCORPORATED UNDER THE LAWS OF THE STATE OF NEW YORK.

I. This association shall be known as the Telegraphers' Mutual Life Insurance Association, and be organized under the general State law of the State of New York.

II. Its officers shall consist of a Treasurer and Secretary.

III. There shall be an Executive Committee of five, of which the Treasurer and Secretary shall be members, who shall exercise a general supervision over the affairs of the association and decide all questions which may arise.

IV. No officer shall, at present, receive any remuneration for his services.

V. No expense of any kind will be allowed except for expenses of incorporation, stationery, postages, circulars, certificate and advertising.

VI. Any person, regardless of sex or class, may become a member of this association provided they are or have been employed in the telegraph business and subscribe to these articles, and are unobjectionable to the Executive Committee.

VII. The initiation fee shall be one dollar and fifty cents, one dollar of which shall go to the contingent fund, and the balance to the expense account.

VIII. Upon the death of a member the Treasurer shall immediately, on application by the proper parties, pay over to them the fund which is on hand for that purpose, that is, the whole of the contingent fund on hand from the previous assessment.

IX. It shall be the duty of each member of this association to leave in writing, the name of his or her executor or heir, failing to do which the amount of insurance shall be used, first, to pay the expenses of burial, and the balance to be given to such relations of the first degree as are dependent on the deceased, or should there be none such, to be subject to the disposition of the Executive Committee for the benefit of the association.

X. Immediately on the decease of a member, the Treasurer shall assess each remaining member $1, payable within thirty days of the issue of the assessment call, neglecting to pay which during the time specified, the delinquent shall forfeit all claims to membership or the benefits of the association, and he shall be restorable only on the unanimous vote of the Executive Committee and the payment of dues.

XI. A meeting for the election of officers shall be held annually during the first week in November in each year, who shall be elected to serve for one year or until their successors are elected. In case of the death of a member of the Executive Committee the remaining members shall have the power to fill the vacancy until the time of the annual election.

XII. Special meetings of the association may be called upon the written request of twenty-five members.

XIII. It shall be the duty of the Treasurer to receive all moneys, sign receipts, and pay bills and claims when audited by the Executive Committee. He shall give suitable bonds for an amount equal to twice the amount of money on hand at the time of his election.

XIV. The Secretary shall keep the records of the association, maintain such correspondence as is necessary with members, and issue such notices as may be necessary. He shall also aid the Treasurer in all matters in which he may require assistance.

XV. Certificates of membership shall be given, signed by the Treasurer and Secretary.

XVI. The books of the association shall always be open for examination by any member thereof.

A. S. BROWN, Treasurer.

W. K. APPLEBAUGH, Secretary.
A. B CHANDLER,
GERRITT SMITH,
D. R. DOWNER,
Executive Committee.

DIRECTIONS TO APPLICANTS.

1. The number admissable as members of the Association at any one time, having been limited for the present to *fifteen hundred*, it is necessary to apply early if membership is desired.

2. Apply by letter, *enclosing one dollar and a half and a three cent postage stamp for each application*, to Gerritt Smith, Secretary Telegraphers' Mutual Life Insurance Association, 145 Broadway, New York, and a certificate of membership will be sent by return mail.

3. Every applicant must be known to the Executive Committee, or to some responsible Manager of a Telegraph Office, and evidence of this, and of good character and of ability to work, must accompany each application. The endorsement of a reputable Manager will be regarded as denoting eligibility as stated, and the signature of the applicant, with date, amount and recommendation, will be all the form of application necessary.

4. Each applicant must file with the Secretary written directions respecting the disposition of the money to which he or she may be entitled at death.

5. No letters can be answered unless a stamp is enclosed for postage; and as the officers labor without compensation, correspondence requiring answers should be as limited as possible.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 13. NEW YORK, JUNE 1, 1872. WHOLE NO. 110.

THE CALLAUD BATTERY.

In consequence of the inconvenience experienced in the use of the Daniell battery from the deposit of copper upon the porous cell, M. Callaud, a clock-maker at Nantes, France, endeavored to discover some process by which it could be suppressed altogether without diminishing the force of the battery or lessening its constancy. In this effort he was entirely successful, for after a series of experiments he found that the difference in the density of pure water, or water charged with sulphate of zinc, and a solution of sulphate of copper, was sufficient of itself to cause an entire separation between them when placed in the same vessel. Accordingly he constructed his battery by suspending a cylinder of zinc near the top of a glass jar, and placing a copper plate at the bottom, and then filling the jar with a saturated solution of sulphate of copper and a diluted solution of sulphate of zinc. The difference in the specific gravity of the two solutions causes them to separate at once and become superposed in the jar, the sulphate of copper occupying the lower and the sulphate of zinc the upper portions of the jar.

The chemical action which takes place in this battery is the same as in the Daniell. The zinc cylinder is oxidized by the oxygen of the water, and the oxide combines with the acid set free by the solution of sulphate of copper, forming sulphate of zinc, which remains in solution, while the oxide of copper, which was previously combined with the acid, being set free, is reduced to metallic copper, and is precipitated on the surface of the copper plate at the bottom of the jar. The reduction of the oxide to the metallic state takes place in the following manner: The water of the solution furnishes oxygen to the zinc, and thus enables it to combine with the acid; while the hydrogen, which is liberated, again forms water with the oxygen of the oxide of copper, with which it comes in contact, leaving the metal free. Hence but little gas is given off during the action of a battery charged by sulphate of copper, as the hydrogen is in this case mostly absorbed.

When all the sulphate of copper has been decomposed the action ceases, and sulphate of zinc will be reduced upon the copper plate as a black powder. It is necessary, therefore, to provide a constant supply of sulphate of copper. A few crystals of sulphate of copper should always remain in the bottom of the jar undissolved.

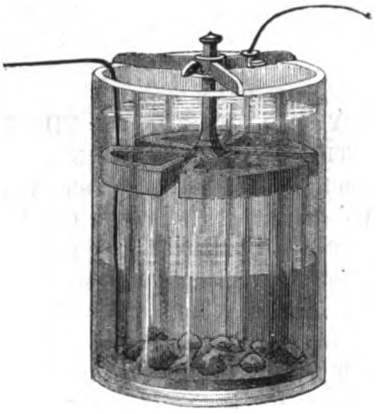
When the water in the upper portion of the jar becomes saturated with sulphate of zinc, the sulphate crystalizes upon the zinc plate, stopping the action of the battery. The conducting power of a solution of sulphate of zinc is greatest when diluted with an equal quantity of water. Part of the solution should, therefore, be from time to time removed and replaced by water.

When crystals form on the top and sides of the cell, in consequence of the water being charged with sulphate of zinc, they should be removed with a damp cloth.

The bottom of the zinc cylinder should be four inches from the copper plate.

Half a pound of sulphate of copper is sufficient to charge a fresh cell of the Callaud battery, and to leave a portion of the crystals undissolved. A pint of water, at the ordinary temperature of the atmosphere, is capable of dissolving one-quarter of a pound of blue vitriol

In starting a fresh Callaud cell it is better to use a small quantity of the sulphate of zinc solution taken from some other battery, but if this cannot be readily obtained, a solution of Glauber's salt (sulphate of soda), or even common salt (muriate of soda), will answer. It is not necessary, however, to use any thing but common water. In this case the two poles of the battery should be connected together in short circuit for a few hours, when it will make its own sulphate of zinc solution.



The above cut represents an improved form of the Callaud battery, recently designed by Mr. Phelps, which is to go into general use upon the lines of this Company, in place of the bi-chromate of potash and nitric acid batteries.

HIMMER'S IMPROVEMENT IN ELECTRIC BATTERIES.

The improved battery which forms the subject of the present notice is the invention of Vitalis Himmer, of the city of New York, and it is claimed that the arrangement employed permits the power to be regulated at will, and that a supply of its source of power can be attached to it to keep it operative for a length of time practically limited only by the supply of the material. The battery cup is made of glass or other suitable material. A small vessel of truncated conical form is placed upon the bottom of the battery cup. A vessel of suitable size and shape is filled with sulphate of copper and water, and provided with a neck, through which a small tube is fitted, this tube being preferably held in a cork, in which it may be shifted up and down and still held secure. This vessel is inverted, and placed upon the battery cup, so that its tube enters the truncated conical pot, placed in the battery cup, to a greater or less depth. The copper element of the battery is placed in this pot. The zinc element of the battery is placed within the upper part of the battery cup, and held there by its own spring pressure.

The outside battery cup described being filled with salt water, the vessel holding the sulphate of copper and water is inverted over the cup, its tube entering the pot. The upper end of the tube is preferably closed; and small perforations are cut near the top through it, so that they will not be liable to become clogged by pieces of sulphate of copper. The water in the inverted vessel will gradually dissolve the sulphate of copper, the solution flowing into the pot containing the copper element, where, on account of balanced pressure, it will rise no higher than the lower end of the tube. That amount of surface of copper which is in actual contact with the above-named solution will be active in the battery, but not the remainder. The depth to which the tube is immersed, and the consequent height of the sulphate of copper solution, determine, therefore, the strength of the battery. The zinc will, by the contact with the water, always be ready for action, the spent zinc dropping to the bottom of large battery cup, but not into the pot containing the copper element.

When the battery is active, the solution in the latter will be gradually absorbed and a new supply constantly given down in such ratio as is necessary to provide the active effectiveness of the battery. When the battery is not used there will be no displacement of solutions. The cup containing the sulphate of copper and water may be secured upon the battery cup in such manner as to secure it air tight, in which case evaporation is absolutely prevented. A battery of this kind can, it is claimed, be kept in effective operation continuously for years, without requiring the least addition or replacement of parts, provided the copper and zinc are of sufficient size, and the supply vessel large enough to hold the requisite amount of the sulphate of copper.

THE TELEGRAPH DURING THE CINCINNATI CONVENTION.

Every one acknowledges that the telegraph is a wonderful arrangement for transmitting news. The wires were taxed to their utmost extent during the session of the Convention which has just closed its labors in this city, resulting in the nomination of Greeley and Brown for President and Vice-President of the United States, and the quantity of news transmitted is almost incredible. It has been ascertained that *six hundred thousand words*, or an amount equal to about *three hundred columns* of the *Enquirer*, were sent by the indefatigable correspondents and the Associated press during the Convention to the various newspapers of the country. It will thus be seen what can be done in an emergency by the telegraph, and also what a demand there is on the part of the public for news.—*Cincinnati Enquirer.*

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LIGHT, HEAT, AND ELECTRICITY FROM MOTION.

The celebrated Jacob Perkins, when in London, in 1887, exhibited at the Adelaide Gallery the phenomena produced by the contact of soft iron with steel in motion, and which he described at the time as follows:

"The action of a soft iron disk upon hard steel, such as a file, is exhibited four times a day. This has been regularly kept up for three years, yet it has undergone very little wear. I am of opinion, in fact, that if the file had never been held upon it until it had attained its full velocity, there would not have been any loss of metal. I do not know to what extent the combustion of steel by soft iron may have been carried in the United States, but our experiments are so brilliant as to excite the highest admiration, and to induce numbers to repeat their visits to the Gallery. Our disk is a foot in diameter, and an eighth of an inch thick. It requires about a three-horse power to drive it, and revolves about 6,000 times in a minute. It is very accurately fitted up with friction wheels. The blaze of light, which rises about twelve inches, perpendicularly, from the point of contact, is so vivid that few persons can look steadily at it even at noon day. The stream of light is about an inch and a half thick at the distance of a few inches from the point of contact; and at the distance of seven or eight feet, it spreads out to about ten inches. The sparks not unfrequently touch the ceiling, which is about twenty feet high; a ring of fire is seen all around the disk, appearing like a band of light about five-eights of an inch wide. Of what does this light consist? It is manifestly different from that of the sparks, which all fly off in a tangent. In operating with the disk, it never becomes warm; the file, however, has to be held at least two inches from the sharp end, as it becomes highly heated. The whole appearance, in fact, is very interesting, and when fully investigated, I am well convinced that some of the phenomena will be found to depend upon electricity."

SURFACE ELECTRICITY.

It is well known that Faraday made numerous experiments upon this subject, and has varied, under different forms, that which Coulomb has realized with the hollow sphere and its two covers. It is still under this form, the least commodious, that this experiment is repeated in the lecture room.

If the loss is considerable on the day when this experiment is performed, it ceases to be sufficiently conclusive; for it requires, first, to electrify the sphere alone; second, to recover it rapidly with its two covers; third, to take them off; fourth, to prove that these covers are electrified; and fifth, that the sphere is not. The second operation cannot be executed with great rapidity, on account of the form of the covers.

Amongst other experiments, Faraday has made the following: He took a cylinder made of metallic gauze, placed upon an insulated horizontal metallic disk, the design being to afford proof that the exterior is alone electrified. An animal, such as a mouse, placed in the interior, showed no commotion, even when the whole apparatus was electrified so strongly that bright sparks might be obtained from it.

Faraday did more: he constructed a cubical chamber twelve feet on each side, with laths, the walls were of wire gauze and of paper, and the whole chamber was suspended by means of silken ropes. The chamber, even the interior could be electrified ngly on connecting it with an electric machine. Faraday inclosed himself in this chamber, with electroscopes and various other apparatus, but he failed to find the least trace of electricity, whilst the walls were so strongly electrified that vivid sparks were obtained from the outside, and "brushes" escaped spontaneously.

M. Terquem has endeavored to repeat this experiment in his lectures, on a small scale, in the following manner: He took any form of bird cage, whether of wood and iron wire, or entirely of metal, and suspended it to some isolated conductor in communication with the electric machine. Inside the cage was placed a gold-leaf electroscope, and also pieces of tinsel, the feather of a quill, and pith balls. Whilst it was possible to obtain vivid sparks from the cage, nothing moved in the interior. Within the cage was suspended a bundle of linen yarn, and underneath the cage a similar bundle; the interior bundle remained undisturbed, whilst the exterior was greatly excited and electrified, all the bits of yarn spreading out, and on approaching the hand the peculiar cracking due to electricity was heard.

Bands of paper being stuck along the length of the wires of the cage, the exterior bands would twist strongly and get displaced, whilst the interior remained vertical and unmoved when the cage was electrified. To complete the experiment, a bird might be placed inside the cage, and by his singing and general demeanor prove that he was not only completely indifferent to the phenomenon of electrical charge and discharge, but that behaving so proved that the interior of the cage was perfectly free from all electrical phenomena, whilst the exterior alone was susceptible to the electrical influences. —*Engineering.*

QUANTITY AND TENSION OF THE ELECTRICITY OF A CURRENT.

The quantity of the electricity passing in a current, or the strength of the current, (Fr. *Intensité*, Ger. Stromstärke), is estimated by the power of the current to deflect the magnetic needle, by the chemical decomposition it effects, or by the temperature to which it raises a wire of given thickness and material. The strength of the current must not be confounded with the strength of the cell or battery which gives rise to it. A battery of one hundred cells, is, undoubtedly, a stronger electric arrangement than one cell, yet in certain circumstances, the one cell will give rise to as strong a current as the hundred. The force of the battery, sometimes called the tension of the current, is the power which it has to transmit a current against resistance, such as that offered by a bad, long, or thin conductor. Tension, strictly speaking, is not a property of the current, but of the battery which generates the current; it is a statical property, and is exhibited by the insulated poles of the battery. A current of high tension is one which is maintained by a battery, whose poles exhibit high tension. The tension of its poles is a measure of the electro-motive force of the electro-motor, (*i. e.*, any arrangement such as a cell or battery which generates a current, sometimes also rheomotor). By electro-motive force is understood the power to keep electricity in motion, or to maintain a current against resistance. The electro-motive force of any cell or battery may be measured before the circuit is closed, by connecting the zinc or — pole with the ground, and the insulated copper wire or + pole with a condensing electromoter, and observing the amount of statical tension—*i. e.*, attraction or repulsion produced. The tension, so measured, gives the power of the arrangement to propagate electricity. When the circuit is closed, the electro-motive force is ascertained, as already mentioned, by introducing new resistance into the circuit, and observing the effect produced on the strength of the current. *The electro-motive force of the pair is proportional to the intensity of chemical affinity or the force tending to chemical action, the current strength to the amount of this action or quantity of zinc dissolved in a given time, and the resistance is that which prevents the former from developing the latter.* Tension, when high, is also measured by the length of the spark.

ELECTRO CHEMICAL COPYING PRESS.

This press, the invention of Signor Zuccato, of Padua, Italy, differs but little in appearance from an ordinary copying press, and that difference lies mainly in the construction of the upper and lower beds or surfaces of the press, of which the former consists of a plate of copper, and the latter of a plate of copper tinned, both on mahogany beds—the upper one being attached by lugs or clips to the solid iron press plate, and the lower being made to slide out as shown. These plates are placed in the ordinary way in the circuit of a battery, so that when brought in close proximity by the action of the screw, the circuit is completed and a current established over the whole of the surfaces.

But, by the aid of an insulating medium—a varnish—applied to a steel plate and removable by the action of a "style" in writing, printing, drawing, etching, etc., the electric current is confined to those portions only which are so denuded of the insulating protection; and here it is made to leave record of its passage by its continued action on the steel plate and sheets of copying paper specially prepared and damped with a solution of prussiate of potash. The electrolytic action causes the formation of the ferro-prussiate known as the "Prussian blue." producing a perfect fac simile of the original manuscript or design wrought on the varnished surface of the plate.

The battery employed consists of a single cell, with zinc and carbon elements in an actuating solution of bichromate of potash and sulphuric acid; and its positive and negative poles are connected in the usual way, by spiral coils of insulated wire, with the upper and lower beds of the copying press. The moveable steel plates, on which the writing drawing, or other design to be copied, is made, has to be thoroughly cleaned and well and evenly varnished; care also must be taken, by a firm, steady pressure on the style, effectually to remove the varnish, leaving the writing, printing or other pattern, in bright steel on a raised ground of varnish, affording perfect insulation everywhere else on the surface.

By placing the copying sheets, efficiently damped with the prussiate solution, in any number from one to five or six, one over the other, superimposed on the prepared plate, a corresponding number of copies can be obtained, and so on, almost *ad infinitum.* Thus any required number can be produced with perfect facility and ease—all being fac similes of the original.—*Mechanics' Magazine.*

ACOUSTIC TELEGRAPH.—Professor Weinhold, of Chemnitz, Germany, has invented a phonic telegraph, employing neither electricity, magnetism, light or heat. The wire, which must be very carefully insulated, is attached at both ends to sounding boxes. Words uttered near one sounding box are repeated by the other very distinctly. This telegraph has been found to work well on the short line (2,200 feet long) where the experiment was made.

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THE METRIC SYSTEM.

A movement now slowly but surely gaining groung among statisticians and men of science, is that which tends to the unification of weights and measures all over the civilized world, and—presumably—the adoption of the French metric system. "What," the gentle reader may ask, "*is* the metric system?" Briefly this: The circumference of our earth, measured on a meridian of longitude, is, in very rough figures, about 24,000 miles—a quadrant, therefore, or distance from pole to equator, 6,000. These 6,000 miles contain, evidently, some 30,000,000 feet, of which one ten-millionth part would be three feet—one yard. Accurately calculated, this quantity is 39.37 inches, and has been adopted since the beginning of this century by the French and several other European governments as the basis of their system of measures, under the name of *metre*. Let us, for convenience sake, call this metre forty inches, and see what further comes of it. A hundredth part of it, the *centimetre*, is just about four-tenths of an inch, and is used in France for all smaller calculations in the fine arts and manufactures; while scientific men, with their minute computations, are familiar with a tenth of this—the *millimetre* and its decimal subdivisions. Railroad men and surveyors use a thousand such *metres* under the Greek title of *kilometre*, a little over 3,000 feet, or six-tenths of one mile. These are the familiar units of length; now for measures. Let the reader be good enough to take—or imagine—a little cubical box, one *centimetre* (.4 inch) in cube, filled with distilled water at the temperature at which it reaches its maximum density. The weight of such water gives the unit of weight, the gramme—about 15½ of our grains. By the same consistent system of Greek and Latin nomenclature, a hundredth part of one of these *grammes* gives the *centigramme*, for chemical analysis, druggists' work, etc.; and a thousand grammes gives the kilogramme—or rather more than two of our pounds—for the grocers' sugar and butter, and the manufacturers' heavy materials. Next for liquid measures. Take, as just now, a thousand of these little *gramme* boxes, piled solid, or, what is better, the space they would occupy, and we have a new cube—one *decimetre* in length, breadth, etc., whose contents in distilled water evidently weigh the *kilogramme* aforesaid. The *capacity* of this box, however—as nearly as possible sixty-four cubic inches—makes the French *litre*, or unit of fluid measure—a liberal English quart. If we are doing a wholesale business in fluids, we may need the *hectolitre*, or hundred-quart measure. For dry measure we take a cubical box just one *metre* each way, and have the *stere*, roughly stated at thirty-five cubic feet. Marketing, evidently, would be best done by the *decistere*, or 3½ feet cubic. Housekeepers, who know better than we how much space a peck of peas or tomatoes takes up, will please make their own calculations. And finally, when the farmer wishes to buy land, he takes a ten-metre pole, and the square of which this forms the side is his *are*—about 120 square yards. One hundred of these *ares* give him his ordinary unit of measure, the *hectare*, or two and a half acres.

All this is a little complicated, and needs some figuring, but, apparently, we will have to come to it some day, and might as well begin now. Our young friends—and some older ones—will find it worth while to cipher it out for themselves a bit, over the parlor fire. It will be noticed that the Greek terms run *up*, in multiples, and the Latin ones *down*, in fractions, and that we make no mention of intermediate terms—*decagrammes*, *hectometres*, etc., not actually much used, if at all.—*Scribner's for June.*

THE BOUNDARIES OF SCIENTIFIC KNOWLEDGE.

The lecture on "The Scientific use of the Imagination," delivered by Professor Tindall in Liverpool before the British Association, harps upon a subject which also claimed the attention of Professor Huxley, Mr. J. Clerk Maxwell, F.R.S., and Professor Roscoe, F.R.S., in their respective presidential addresses. All of them expressed the desire to see more of the constitution of common matter than the microscope is competent to reveal. All the leading philosophers of the day agree, perhaps without an exception, that light consists of wave motion of the interstellar ether, the evidence being now irresistible, but they are not so well agreed that common matter consists of vibrating rigid atoms. Professor Tyndall brought one splendid idea to bear with great force on the latter subject. He said, in effect, that when waves of sound strike the ear, if we trace those waves to their origin, we always come to a vibrating string, or tongue, or substance, originating the impulses in the air. When mechanical waves of light strike the eye, if we trace out those waves to their origin, how can we expect to find anything but substantial vibrating particles producing the wave motion? Again, it is absolutely certain that the components of common matter, whatever they may be, are in constant motion.

Helmboltz demonstrated by mathematics that if a "perfect" fluid—that is to say, a fluid destitute of viscosity or fluid friction—were once thrown into a state of vortex motion, it must of necessity preserve that motion to all eternity. Sir William Thompson, taking up this idea, suggested that atoms might be vortex rings of that nature. He and Professor Tait then devised a very remarkable experiment. As they could not get command of a perfect fluid they were obliged to choose an imperfect one—common air—and then they found means to throw it into vortex rings. They took a large square box, and cut a hole as big as a cheese plate in one end; they then cut the opposite end of the box away entirely, and tied a cloth on in its place. Then every time they banged the cloth with the hand at one end of the box, a vortex ring of air was driven out at the other. How were these rings to be made visible to the eye? They filled the box with white smoke, by allowing hydrochloric acid gas to enter the box through one little hole in the side, and ammoniacal gas in excess to enter through another; when these two gases mixed, they formed a dense white smoke, so that every time the cloth was struck, out flew a vortex ring of air, holding white smoke in suspension. The white ring floated about the room, and lasted for some little time, but, air not being a perfect fluid, they finally melted away. It was a curious sight to see two of these rings come into collision in the room, for then they rebounded from each other like india-rubber belts.

This article is headed "The Boundaries of Scientific Knowledge," and there is another field of mystery which enters much into the consideration of the philosophical mind, but which was not brought under the notice of any section of the British Association. That subject is the numerous instances in which solid objects rise or float in the air by some force having no weight of itself, yet competent to overcome the attraction of gravitation. Professor Tyndall recently exhibited a case of this kind at the Royal Institution, when he showed two little fishes cut out of gold leaf quivering in the air near the knob of a charged Leyden jar. What held those fishes there? "Electricity," is the ready reply. Yes; but electricity has no weight, so here is a clear case of a "something" without weight supporting in the air metallic gold, one of the heaviest of the metals. The said "something" was also invisible by daylight, though had the light been shut out a beautiful brush-like electrical discharge would have been seen emanating from the pointed tails of each of the two fishes. Magnetism likewise as everybody knows, will cause a piece of iron to rise in the air in opposition to the attraction of the earth, and this phenomenon is at the present time perfectly inexplicable by the man of science.

A very interesting experiment connected with this subject was recently performed at the telegraphic soirée given at the house of Mr. John Pender, on the occasion of the opening of direct electrical communication with India; the Prince of Wales, it may be remembered, was present on the occasion. As the experiment is a new one, and the details have not as yet, we think, been published in any journal, it may be of interest to many men of science if we publish them here. Lord Lindsay had at the soirée an enormously powerful electro-magnet, with adjuncts to facilitate experiments in diamagnetism. The poles of the magnet were square and two inches across, and when a half-crown was allowed to fall through the air, between these poles, it took four seconds to fall through the two inches of space containing nothing possessing weight, except common air. This is a common enough experiment, but Mr. C. F. Varley, C. E., the electrician, devised a novel experiment to show that the magnetic rays do not hold up the half-crown, but generate electrical currents to produce the effect. He had some copper wires bent into rings and soldered together; the wire was 1-16th of an inch in diameter, and the ring 1¼ in. These rings were seven seconds in falling through the two inches of magnetism, but on breaking the soldered junction, and thus preventing the well-known formation of electrical currents therein, the ring fell through the space very rapidly. Mr. Varley concludes that this experimeut proves "that a current of electricity is as solid and material to a magnetic field as is a plate of iron to a bar of copper." The general subject of the suspension of solid substances in the air, in opposition to the attraction of the earth, and by invisible forces, or perhaps substances having no weight of their own, is worth consideration in one of the sections of the British Association next year.

OCCASIONALLY we fall on some statistics which carry a real meaning to them; and the prosperity of this nation, and the rapidity of its development are indicated somewhat strikingly by the fact that during 1871 nearly 7,000 miles of railroad were constructed in this country—a pretty fair piece of work for one year. These new roads are distributed geographically as follows:

New England	560
Middle States	872
Southern Atlantic	422
Pacific States	170
Northern Central	992
Southern Central	170
Northwestern	3,116
Territories	225

There are now a total of over 60,000 miles of railway in this country. And it is estimated that it requires 400,000 tons of rails annually simply to keep the roads in order.

UTILITY OF SCIENTIFIC DISCOVERY.—Who can tell what a discovery may bring forth? *Cui bono?* applied, as it always is, to a new fact, is as silly as the reply of Coleridge to it was wise. Being asked *what was the use* of a particular new discovery, he retorted, "what is the use of a new born child?"

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THE TELEGRAPH IN AUSTRIA.

We have received from the Director-General of the Austrian Telegraphs the following interesting particulars of the operation of the telegraph in that country for the past two years:

"The gross receipts in Austria for the year ending December 31st, 1870, was 1,858,443 florins ($929,221), and the total ordinary expenses 2,384,208 florins ($1,192,104). The extraordinary expenditures for the construction of new lines, 366,607 florins—($183,303). Deficiency, 525,765 florins ($262,882). Deficiency after adding the extraordinary expenditures, 892,372 florins ($446,136).

Number of messages transmitted during 1870, 2,264,558.

The gross receipts for the year ending December 31st, 1871, was 2,105,298 florins ($1,052,649), and the total ordinary expenses, 2,805,753 florins ($1,402,876). The extraordinary expenditures for the construction of new lines, 479,060 florins ($239,530). Deficiency, 700,455 florins ($350,227). Deficiency, after adding the extraordinary expenditures, 1,179,515 florins ($589,757).

Number of messages transmitted during the year 1871, 2,920,847.

In addition to the above-mentioned messages, meteorological reports from the stations on the Adriatic Sea were collected once a day, transmitted to the Central Meteorological Institution in Vienna, and the reports of this Institution forwarded to Paris.

The quotations of the Vienna Public Exchange were also transmitted gratis every day to all the stations of the monarchy.

The total length of their lines in the year 1871 was 2,459 Austrian miles, and the total length of their wires 7,961 Austrian miles.

The systems in operation in that country are the Morse and Hughes Letter-printing Telegraph. They employ 1,221 Morse instruments, of which 1,125 are embossing instruments and 96 ink writers, and 31 Hughes instruments. They also employ the Morse instruments as repeaters."

TELEGRAPHIC COMMUNICATION WITH AUSTRALIA.

A telegraphic cable has been successfully laid between England and Australia, although as yet there are some four hundred miles of wire to be stretched through the inland Australian wilderness, before messages can reach Melbourne. Since November, Port Darwin, in North Australia, has had the ocean cable landed there, which connects it with Java, India, and the whole Western World. The line now runs from London to Gibraltar, from Gibraltar to Malta, and from Malta to Alexandria, by three lengths of cable under the sea; across the isthmus to Suez, then by cable again under the Red Sea to Aden, then by another length of cable from Aden to Bombay. The Australian message takes to land again here, and crosses India by the Government lines to Madras. At Madras, it is once more transferred to a submarine cable, and is carried to Singapore, touching at Penang. Up to this point, messages for China and Australia have followed the same route. Here they diverge, those for China being taken northward to Hong Kong, Amoy, or Shanghai, while the Australian message is transmitted by cable to Batavia and Java, where it is taken along the Dutch line to Banjoewaugee, and from thence by cable, once more under the sea, to Port Darwin. The whole of the cables forming this enormous chain, have been made and laid by the Telegraph Construction and Maintenance Company. Their contract included a coast line, which was to have been round the north side of the Australian continent, from Port Darwin to Burketown, whence lines exist to Cardwell, Rockhamton, Brisbane and Sydney, uniting with the telegraph from Sydney to Melbourne and Adelaide, and with that from Melbourne to Launceston and Hobart Town. Opinions differ as to the precise date at which the land communications will be completed. Some say June or July.

TELEGRAPHY WITHOUT INSULATION—MEANS OF CHEAPENING INTERNATIONAL COMMUNICATION.

On Wednesday last, Mr. H. Highton read a paper on this subject at the meeting of the Society of Arts. He gave an account of the experiments which he had tried, both on long lengths of naked submerged wire, and on artificial cables, and the conclusions which he drew from them. He showed by experiment that water itself is for electricity of low tension so perfect an insulator, that a long wire on a plate of copper charged with electricity of low tension, will retain the charge even for hours; indeed, quite as obstinately as the glass of a Leyden jar retains a charge of high tension. The instrument he proposed to use for submarine telegraphy is a light slip of gold leaf, weighing from 1-500th to 1-2000th part of a grain, acted on by a powerful electric magnet, and with its motions optically magnified. The delicacy of this is so great, that simply looking at a thermopile will transmit a visible signal through the resistance of the Atlantic Cable, and a kiss or grasp of the hand a very strong signal. So that a modern Pyramis and Thisbe might exchange salutations not through a hole in the wall, but through the breadth of all the waves of the Atlantic. The use of this instrument gives an opportunity of using electricity of the very lowest tension, which, besides its other advantages, has a much less tendency to escape by faults in the wire. It was shown that a fault which caused the disappearance of all visible signals through Thompson's Speaking Galvanometer, with a resistance of 500 units, or about 125 miles of the Atlantic Cable, would still allow intelligible signals to be transmitted on this instrument with 10,000 units, or about 2,500 miles of resistance. The other advantages were the absence of all swing, such as there is in a needle, and an instantaneous movement, in spite of electro-static induction. Where it requires two or three seconds for the wire to accumulate sufficient charge to overcome the initial friction in any instrument where there is any friction, however slight, which he proceeds to move at intervals of seconds by jumps, the gold leaf having no friction begins to move instantaneously, and proceeds by an equable motion. Again, where increased sensitiveness is required, the only thing necessary is to increase the force of the electro-magnet at the receiving end. The conclusion the author drew from his experiments was, that instead of the hundreds of thousands of units of insulation of the present cables, it would be quite feasible to work through a cable having only a single unit of insulation; or if greater insulation were desirable, a wire might be used presenting much more resistance to the currents, such as a steel wire, possessing more strength, and cheaper than copper, and that electro-static induction being less injurious, much cheaper, with less gutta percha, cables might be used costing some fifth or sixth of the present prices, and that thus telegraphy might be made much cheaper and more available for hundreds of thousands of poor emigrants, instead of being the luxury of rich merchants, or speculators, or government officials. £50 a mile ought to provide a wire sufficient for all purposes of any required length.

ELECTRICAL POTENTIAL.

BY PROFESSOR J. D. EVERETT.

Electrical reasonings are, in many cases, greatly facilitated by employing the conception denoted by the name electrical potential. It may be defined as follows:—There is electrical force at a point in the air, if an electrified particle placed there would experience force tending to move it in virtue of electrical attraction or repulsion; there is electrical force at a point in a conductor, when electricity flows through the point, a conductor is said to be in electrical equilibrium when there is no electrical force at any part of it—in other words, when it is completely free from currents of electricity. Potential essentially depends upon forces (whether attractive or repulsive) mutually exerted upon each other by particles at a distance, and has been advantageously employed in the theories of gravitation and magnetism, as well as of electricity. We shall at present confine our attention to electrical potential. All the space in the neighborhood of electrified bodies is in a certain sense pervaded by their influence. This influence is completely specified by stating the numerical values, with proper sign, of electrical potential, at the different points of the space. Electrical potential never changes its value, per saltum, in passing from one point to the next. Moreover, if it is constant in value throughout any finite portion of a space not containing electricity, it is constant throughout the whole of this space. When electrical potential is constant throughout a given space, there is no electrical force in that space; and conversely, if there be an absence of electrical force in a given space, the potential throughout that space must be uniform. These propositions apply to the whole substance of a solid conductor, and to the whole space enclosed within the outer surface of a hollow conductor. Whenever a conductor is in electrical equilibrium, it has the same potential throughout the whole of its substance, and also through any completely inclosed hollows which it may contain. When a conductor is not in electrical equilibrium, currents set in, tending to restore equilibrium; and the direction of such currents is always from places of higher to places of lower potential. In like manner, when a small positively electrified body experiences electrical force tending to move it, the direction of this force is from higher to lower potential. When flow of electricity is compared with flow of heat, potential is the analogue of temperature. Heat flows from places of higher to places of lower temperature.

The precise direction of the force exerted upon a positively electrified particle (or upon an element of positive electricity) when brought to a place where potential has not a constant value from point to point, is the direction in which potential diminishes most rapidly. A negatively electrified particle (or an element of negative electricity) which potential increases most rapidly. We here use the words *increase* and *decrease* in the algebraical sense.

THE electric telegraph has reached Vardoe, a little town in the northeastern extremity of Norway, probably the northernmost town on the globe.

VELOCITY OF SOUND THROUGH WOOD.—The velocity of sound through different kinds of wood, varies very considerably. It travels faster in the direction of the fibre, than across it. The velocity of sound through pine, lengthwise of the grain, is 10,900 feet per second. Across the grain it is only 4,611 feet.

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CORRESPONDENCE.

TRAIN DISPATCHING.

May 16, 1872.

To the Editor of the Journal of the Telegraph:

Some one, signing himself "Scat," writes in May 1st number of the JOURNAL, in regard to train orders. His first point appears to be an endeavor to raise a laugh on the "old man," and in so doing, he says: "In speaking my little piece, I desire to differ from the 'old man' *whose fifteen years experience has taught him* that in an order for trains Nos. 1 and 2 to meet at A., that the conductor of No. 2 can fall back on his dignity, or schedule, rather, and refuse to proceed until he has received a positive order giving him the right against No. 1. Me thinks I hear an audible smile amongst the old stagers." In reply to this I will say, first, "Scat" is mistaken in the way my article reads, or else he purposely misrepresents its words. I said: "I have had fifteen years' experience in railroading and telegraphing, *and this experience tells me that the safest way is the best.*" These were my words, as the JOURNAL will show. As to "Scat's" plan, I think it a very good one, and know that it has worked very well on the road which heads his letter. But I think there are better plans. In my time I worked some eight or nine months for the road he mentions, and I remember that this plan which he advocates as being perfect, failed to work so in my judgment. Both operators at points wanted were often not on hand at the same time. This caused the delay of *two* trains until operators were at their posts. I know my plan is an old one; but it is a *safe one*, and that is what I am trying to get at—the safest way to run trains under telegraph orders. Under the present system, as generally practiced, there are few schedules but what it will conflict with. Suppose "Scat" were to send his orders to two trains at same time, and in a minute or two after one train had got its orders and gone on, the fact should be demonstrated that the other train had broken down, or from some other cause could not make the point, and this point should happen to be *between* telegraph stations. The train which has gone is laid out for by its positive order; it cannot go ahead until the approaching train arrives or its order is made void. I never have yet seen or heard of a system of train orders that was *perfect*, and I think one would be very hard or impossible to arrange. No train dispatcher can tell at what moment any one or more of his trains will break down or fail to make time. These are times when a "positive order" will work the best; and again, there are times when a "time order" is most effective. I see no system that can be made uniform for all times or circumstances, and hence I think the *safest* is the *best*, and circumstances are bound to govern the system.

"OLD MAN."

ECONOMY IN LEAD PENCILS.

To the Editor of the Journal of the Telegraph:

Anything that occasions the saving of a penny is worthy of consideration. In this connection I would speak of the gutta percha pencil holder. It is well known that of the lead pencils used in telegraph offices, generally about one-third of the pencil is thrown aside after the other two-thirds are worn away. By the use of the holder referred to a pencil can be used until it is less than an inch in length, fully as well as when it is full size. The holder is simply a rubber tube shaped like a tapering wooden pen holder, with an opening in the larger end for admitting the end of the pencil. If such a simple, inexpensive article could save to the Western Union one-third or one-fourth of the pencils sent out, would it not make a very large item in a year? I have no ax to grind, nor do not know who is the manufacturer of this cheap commodity. I understand that these holders are used by the Union Pacific Railway Company.

ECONOMIC.

To the Editor of the Journal of the Telegraph:

Are managers compelled to write messages for those who are able to write themselves? Furthermore, are they expected to abbreviate messages when requested by persons handing them in? Where messages require answers, how long is it necessary for a messenger to wait for it after delivery? Must he await the convenience of the party replying, even though it takes a half an hour? Such is a frequent occurrence, to the detriment of other messages. Is Rule 58 only applicable to large cities, or does it include towns of 12,000 inhabitants?

ANSWER.

Managers are not compelled to write messages for persons who are able to write themselves, nor should they abbreviate messages when requested to do so by persons handing them in. Persons who desire to have their messages abbreviated should do it themselves. When requested to do any duty of this kind, the manager should decline in a courteous manner, and explain to the customer that they are requiring a service which the manager is not authorized to perform.

No general rule can be given as to how long a messenger should await for a reply to a message after it is delivered. It is of the utmost importance that a reply should be obtained to all messages which require them, and if the messenger should be compelled to wait 10 or 15 minutes to obtain one, it might save the transmission of one or more office messages of enquiry, and thus save to the company much more valuable time in the use of its wires than the value of the messenger's time in waiting for it.

Rule 58 is applicable to all Western Union Telegraph Offices, whether large or small.

To the Editor of the Journal of the Telegraph:

Will you please inform me how many words there are in the following message?

"DAYTON O., May 23.

"*To J. H. Reid & Co., N. Y.:*

"Best figures on oats; first half June; white and mixed. (Signed.) S. G. SMITH.

"Answer Carlisle, O."

There are 10 words in body of message. The question is, should the words "answer Carlisle, O.," coming after signature, be counted? Also, if just the word "answer" is put just after the signature, should it be counted the same as if inserted in body of message? By answering this through the JOURNAL, you will much oblige S. C. ROBINSON,

Opr. Union Depot.

ANSWER.

The words "answer Carlisle, O.," should be counted. The word "answer" placed after the signature, should also be counted. We are aware, however, that many offices do not charge for the word when in that position.

H. C. STRONG, of Baraboo, Wis., is advised to study "Pope's Modern Practice of the Electric Telegraph," and Prescott's "History, Theory and Practice of the Electric Telegraph." Both are Standard works.

NEW MARKET, Ohio, May 23, 1872.

To the Editor of the Journal of the Telegraph:

Would like answer to one or two questions, and others would perhaps be benefited at same time:

1. Is the holder of a frank entitled to receive answers D. H. to a message sent on that frank?

2. Can intermediate offices work Stearns' double transmission, as well as terminal ones?

3. Is not "can not" two words? I claim that they are, while a great many operators claim them to be one word. Have had a number of disputes with regard to it. By answering, you will greatly oblige ACCLURIO.

ANSWER.

The holder of a business frank is entitled to receive a free reply to a message sent on account of a frank. The holder of a social frank can receive a free reply by putting one or more additional stamps on the message that he sends, in accordance with the conditions named on the frank.

Stearns' Double Transmitter is not adapted for way stations.

"*Cannot*" is one word.

WAVERLY, N. Y., May 28, 1872.

To the Editor of The Journal of the Telegraph:

Having had a little controversy in regard to the words "car load," we have decided to leave it to you.

I claim that *car load* is two words. Am I right or wrong? By replying through the JOURNAL you will greatly oblige G. B.

ANSWER.

Car load should be counted two words.

DON'T LET THIS CHANCE SLIP.

To the Editor of the Journal of the Telegraph:

Will you have the kindness to announce that through John Ritchie, M. C., an effort is being made to get before the House of Representatives a bill giving to each operator, who served ninety days as operator in late war, one hundred and sixty acres public land, upon the same terms as that given to soldiers, by a recent enactment.

We can have it by simply asking for it.

Let every one contemplated in such an act at once write an individual letter to Mr. Ritchie, giving his voice for or against the measure.

Mr. Ritchie will need no further help than this.

We must be quick, or it will go over to next session. ISLAND No. 10.

INFORMATION WANTED

Of telegraph operator named ——— Moore, alias Jas. or Chas. Q Morgan. Is about five feet six inches high, weighs about 125 or 130 pounds, sandy hair, moustache, and wore when last seen here, short whiskers all over his face; eyes blueish gray; pleasant address; names given above probably assumed. He is a forger. Any information concerning this man will be thankfully received. Address Ben. S. Pillow, Box 28, Devalls Bluff, Ark.

EVERY iron rail on a north and south railroad, so far as I have been able to examine, is a perfect magnet, the north end attracting the south pole and the south end attracting the north pole of a magnetic needle. So, also, in a T rail on such a railroad, the lower flange attracts the south pole, and the upper flange the north pole of a needle.—(Dr. Richard Owen, of Indiana State University).

THE WONDERS OF THE TELEGRAPH.—A correspondent at St. Louis, Mo., gives us the particulars of the sending of telegrams from that city to Hong Kong, in China, and the return of answer, the time each way being only four hours, the message being sent and reply received both during the same day.

ELECTRICITY is developed in metallic wires by merely bending them, and the development appears to be independent of any thermic action.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

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JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, JUNE 1, 1872.

PROBABILITIES OF SUCCESS IN ENTERING THE TELEGRAPH BUSINESS.

It is our purpose in this article to treat upon, in a general way, the chances for success in life of a young man entering the business. Nothing is further from our intention than to say a discouraging word to the intelligent and ambitious now engaged in the business of telegraphing, nor to the many of the same character yet to enter. On the contrary, we desire, in pointing out the exact prospect before the beginner, to encourage, by both word and example, every praiseworthy effort to excel and to succeed. But regard for the truth, and a desire for the true advancement of our co-laborers, impels us to say here, that which may, perhaps, from a superficial reading, tend to depress the hopes and aspirations of many. There are probably those among us, however, who will see in our remarks that which will cause their efforts and their ambition to be directed to its proper course.

The beginner must understand from the first, that in the telegraph business there is no royal road to success; that whatever is to be acquired in skill and proficiency, is obtained only by sheer perseverance and hard work. Therefore, after this business has been decided upon, with a determination to make it a business for life, with a resolution that will combat all the difficulties which attend more or less every undertaking, the great and grand object to be held constantly in view, is to use all the available means for acquiring a practical and thorough knowledge of the business. It cannot be too deeply impressed upon the mind that application is the price to be paid for mental acquisitions, and nothing is as absurd as to expect them without it.

The first rule for rising is, that a young man *shall make common cause with his employer—that he shall entirely identify himself with his interests.*

This being properly understood, and skill and general attainment being granted, success is certain.

But what constitutes evidence of success? It may be said that promotion is the most sure evidence. To an extent, this is true, but it can not be so to all, for the positions open for preferment are but few, compared with the number of those who consider themselves qualified to fill them. No; the surest evidence of success and excellence is in the estimation and appreciation in which he is held by his employer. All cannot be promoted, but all can render themselves worthy of promotion.

So many would not be disappointed, if, in the outset, the goal of their ambition were properly placed; that the right direction be given to the mind. It should not be taken for granted that a business career is unsuccessful because promotion in position has not been arrived at.

The position of operator upon a commercial line, notably the service of the Western Union Company, is, undoubtedly, in a pecuniary point of view, and in opportunities for advancement, either within its own limits, or in the first class positions now so rapidly opening for competent men upon the great railroad systems of the country, superior to anything open to a young man in any other business. The opportunities for the cultivation of the mind, and the actual acquirement of a general practical business education, to the close observer, qualifying him for almost any position or business in life, are unsurpassed in any college in the land.

Let the beginner, from the outset, resolve not to seek promotion, but rather let promotion seek him. Let him prove his ability to fill a better position than which he holds, and the position will find him. What is true for the beginner, is also necessarily so for the experienced operator. Let them master every detail of the service, and be certain that they fully understand the placing of instruments in position, running connections, the formation and the care of batteries. Then let them take up the more difficult branch—that of the science pertaining to telegraphy; for it is in that field that the successful men of the future will be found. Earnest pursuit after success will certainly attain it, and its attainment will carry with it elevation and honor.

In this pursuit new discoveries will, from time to time, be made, which will benefit all concerned and be of interest to the whole world.

The communication of such discoveries to the JOURNAL would be gladly received; and here it is that the JOURNAL could afford the most powerful aid to the student, in securing to him, and himself alone, that meed of praise and reward which may be due to his intelligent industry. This is one part of the mission of the JOURNAL, and, in fulfilling it, the one which will afford us the greatest satisfaction.

DURING the year ending December 31st, 1871, the Western Union Telegraph Company erected 11,741 miles of wire in new construction, 2,488 miles of wire in reconstruction, and 725 miles of wire in repairs, making a total of 14,954 miles of new wire put up by this company during the past year.

They also used 934,122 insulators, 50,433 feet of cable, 204,889 cross-arms and 53 tons of spikes and nails.

AT a meeting of the Executive Committee of the Western Union Telegraph Company, held on the 4th day of May, 1872, the following resolutions were unanimously adopted:

Resolved, That in accepting the resignation of James D. Reid, Esq., the Executive Committee desire to bear testimony to the faithful service which for more than twenty years he has rendered to the telegraph system of the country. Connected with the earliest lines opened for commercial business in the United States, familiar with the development of the business, prominent in the local telegraph organizations of earlier days, and continuing in the service after their consolidation into the more harmonious and perfect system which supplanted them, he has given to the telegraph the best labor of his life. He has brought to that labor an unremitting diligence, an integrity of purpose, a purity of character, a spirit of kindness, forbearance and charity, which this Committee do not fail to appreciate, and which have deservedly obtained the esteem of his associates and the affection of his subordinates.

Resolved, That as a testimonial for faithful service, and as an equivalent for three months leave of absence, the President be and he is hereby directed to pay to Mr. Reid the sum of five hundred dollars.

A true copy from the minutes.

(Signed) G. H. MUMFORD, Sec'y.

OUR friend Miller, Train Dispatcher for the Illinois Central Railroad Company, at Amboy, Illinois, must have his "ancillary" qualities well developed. For the second time since he has filled that position, have those under his charge manifested their good will and appreciation toward him. This last in the shape of a handsome gold watch chain, accompanied by some very kind words.

ATTENTION is called to the advertisement of Bradley's Telegraph Instruments, by F. L. Pope & Co.

As the stock on hand is limited, and no more to be forthcoming, those in need of telegraph machinery, and preferring the Doctor's style, would do well to hasten their purchases.

THE little "sounders" manufactured by M. A. Buell, of Cleveland, are making him famous. Orders are pouring in upon him so rapidly, that he has had to increase his facilities for manufacture in order to keep pace with the demand.

See his advertisement in another column.

CHURCH'S MUSICAL VISITOR for May, just received, gives evidence of a very gratifying prospect of the fulfillment of every ambition of the publishers to produce a popular art journal in America. The nine pages of music in this number are particularly good. Published by JOHN CHURCH & Co., Cincinnati, O.

MR. J. W. COOMBS, for several years past connected with the *American Artisan*, has retired from that paper and disposed of his interest to Mr. Leicester Allen, The business will hereafter be conducted by Messrs. Brown & Allen, the latter gentleman assuming the editorial management, for which his extensive experience as associate editor of the *Scientific American* for some time past, and his great industry, particularly qualify him. The new firm have our best wishes.

NO COMMENT of ours can add force to the resolution adopted by the Executive Committee of the Western Union Telegraph Company, in accepting the resignation of Mr. J. D. Reid, from their service.

The Company has officially expressed their appreciation of Mr. Reid's character and services. Shall his immediate friends and associates in the service do less?

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REASONS WHY ALL TELEGRAPHERS SHOULD SUSTAIN THE JOURNAL OF THE TELEGRAPH.

Because it is a first-class journal, especially adapted, in its reading matter, to the wants of those interested in its speciality.

Because it is a handsomely-printed sheet, at all times with twenty-four, and occasionally with thirty columns of interesting matter.

Because it will, from time to time, contain instructive and entertaining articles upon the science pertaining to telegraphy, from the pens of leading scientists, both in this country and in Europe.

Because its columns are open to all to ventilate abuses and to suggest reforms.

Because it is at all times willing and anxious to impart information in the line of the profession, and there is none more competent.

Because, with all these advantages, its subscription price is so low—barely meeting the cost of the paper upon which it is printed.

In a kind note from an old friend, in suggesting a course of conduct for the JOURNAL, he says:

"We would like to see more of the 'comic' side of our business in the paper. Can't you stir up some interest in that line?"

No one enjoys a joke more heartily than ourself. We would rather laugh than cry at any time; and so, doubtless, would all of our readers. Will the funny fellows consider themselves stirred up? Let no one who has a good joke in store selfishly keep the laugh all to himself; let us all laugh with him.

Our correspondent did not stop with a suggestion. He gives his mite to start the ball; a good one, too. Here it is:

"Here's a laugh: A Teuton left the following message at this office yesterday P. M., *verb. et lit.*:

"'*To Mrs.* ———.

"'NEW BRUNSWICK, N. J.

"'Done by fried I kome do moro.'

"Receiving clerk translated it for operator, and it was sent:

"'Good bye, Fred. I come to-morrow.'"

"There probably was a puzzled *vrow* in New Brunswick last night. It should have been sent:

"'Don't be afraid. I come to-morrow.'"

Here's another—

"The other day, a bright youth (a veteran operator he styles himself,) sent a key to his Superintendent for repairs. Accompanying the key was a note to the following effect: 'Please put in new *magnets*, as it won't work.'

"This veteran's application for an increase of salary is on file."

Send us some more.

Owing to a press of matter at the moment of going to press, we are compelled to omit the "Service" report for March. Also the acknowledgement of receipt of assessments by the Telegraphers' Insurance Association. Both will appear in our next.

Brain-work costs more food than hand-work. According to careful estimates and analysis of the exertions, three hours of hard study wear out the body more than a whole day of severe physical labor. Another evidence of the cost of brain-work is obtained from the fact, that though the brain is only one-fortieth the weight of the body, it receives about one-fifth of all the blood sent by the heart into the system. Brain-workers, therefore, require a more liberal supply of food, and richer food, than manual laborers.

ATLANTIC CABLE.

TARIFF AND RULES FOR ATLANTIC CABLE BUSINESS.

This order contains complete instructions concerning Atlantic Cable Business, and supersedes all previous orders relating thereto. All messages must be prepaid.

TARIFF OF RATES, PAYABLE IN GOLD, TO ALL POINTS IN GREAT BRITAIN, IRELAND AND FRANCE.

	To Great Britain and Ireland.		*To France.*
NOTE.—The 10 word minimum on business to or from Great Britain and Ireland is abolished.	FOR EACH WORD.	FOR TEN WORDS OR LESS.	FOR EACH WORD OVER TEN.
From New York City, and all points in Nova Scotia, New Brunswick and New England States	$1 00	$10 00	$1 00
From all points in New York (except New York City), New Jersey, Pennsylvania, Delaware, Maryland and District of Columbia	1 03	10 30	1 03
From all points in Virginia, West Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, Tennessee, Kentucky, Ohio, Indiana, Illinois, Michigan, and Wisconsin, from St. Louis, Mo., and from Western Union Co's offices in Florida	1 15	11 50	1 15
From all points in Texas, Arkansas, Missouri, (except St. Louis), Kansas, Nebraska, Iowa, Minnesota, Colorado, Dacotah, Wyoming, New Mexico, Utah, Idaho, Montana, Nevada, California and Arizona	1 30	13 00	1 30
From all points in Oregon, Washington Territory and British Columbia,	1 50	15 00	1 50

RULE 1.—*Check.*—You will state in the check:

1. The number of words in the entire message, including address, date and signature.

2. The amount charged.

RULE 2.—*Count*—The address, signature and date (if message is dated), must be included in the count and charged for.

The name of sender, and "place from," and "date," should form a part of every message, but are not absolutely required in messages to Great Britain and Ireland. Should the sender omit the "place from," it must be sent with the check. The sender is responsible for insufficient address, and corrections or alterations can be made only by a new message, which must be paid for.

The "station from" must be inserted and paid for in messages to points beyond Great Britain and Ireland.

Compound names of places, including names of Countries States, Islands, Cities, Towns, etc., and compound words, count as one word; names of individuals, firms, vessels, streets, and all other names count for as many words as they contain. The prefixes "Van," "Von," "St.," "Fitz," etc., d' or de, l', le or la, before names of *places* and *individuals*, will NOT be counted separately. In other cases they will be charged as single words.

F. O. B. and C. F. I., when written as separate letters, are each counted as three words; but when written fob, cfi, as one word.

In ordinary messages, figures and letters *having no secret signification* are counted as follows:

Every group containing five characters or less counts as a word; beyond five and up to ten, two words, and so on. Any isolated figure or letter counts as a word.

Decimal points, commas, and bars of division, used in conjunction with figures or letters, in such messages, are counted each as a figure.

EXAMPLE.

"Gold, 135⅜—135⅝; Exchange, 108¼; Cotton, 34; Petroleum, 32¼," is counted as follows:

Four ordinary words, equal to.....4 words.
135⅜—135⅝, equal to 13 figures or.....3 words.
108¼, equal to 6 figures or.....2 words.
34, equal to 2 figures or.....1 word.
32¼, equal to 5 figures or.....1 word.

Total number of chargeable words, eleven.

The comma or dash separating different groups is not counted or transmitted; but commas or dashes inserted by the sender, and forming part of a group, are counted and transmitted.

The receiving clerk must ascertain whether commas and dashes belong to groups, or are used merely to separate them.

Several quotations of stocks, numbers and prices of goods, &c., cannot be combined in one group unless the message is paid for as cipher, at double rates.

Letters added to figures, to form ordinal numbers, are counted each as a figure; thus, 137th is counted as five figures, or one word.

When figures are expressed in words by the sender, each word must be counted.

Two pence, three pence, etc., up to *eleven pence*, count as one word in each case.

Words must be written in full—abbreviations will not be allowed, except such as are in ordinary use, as Co. for Company, St. for Saint.

Underlines—When words are underlined, each underline counts as one word.

RULE 3.—*Messages beyond Telegraph Lines.*—Messages destined for places beyond the Lines of Telegraph must contain instructions from the sender, as to the places from which they are to be posted. Such instructions must be inserted immediately after the address, and charged for as part of the message. Thirty-seven cents, gold, must be charged extra for postage in such cases.

RULE 4.—*Prepaid Replies.*—The sender of a message may prepay the reply as follows: The sender must insert, immediately after the address, and pay therefor, the words "Reply—— words, paid." The number of words paid for will be written in the blank space. In cases where more than one reply is required and prepaid, the sender must state the number of replies thus: "Three replies, each —— words, paid."

Should the reply contain more words than the number specified and paid for, the sender of the reply must pay for it as a new message, at regular rates; and in such cases the amount deposited for the reply by the sender of the original message will be refunded to him, if it is ascertained on investigation at headquarters, that the reply is fully paid for by the sender thereof.

Should the reply be presented later than eight days after arrival of original, it must be treated and paid for as a fresh dispatch.

Amounts deposited to prepay replies must be entered in account, and remitted as a part of the tariff upon the original message; and must not, under any circumstances, be refunded without instructions from headquarters.

Messages to which a reply is prepaid, must not only contain the words, "Reply, —— words, paid," as a part of the message, but *must show in the check* the amount thus prepaid. For example: A message of ten words, from Virginia to London, to which a ten word reply is prepaid, must be checked thus: "10 paid, $11.50, and $11.50 for reply."

Replies which have been prepaid, must be checked in the following manner: "10 collect, $11.50—prepaid reply to No. —— of 28th."

RULE 5.—*Repeated Messages.*—In order to more effectually secure accuracy in transmission, messages may be repeated back from the station at which they have been received, to the station from which they were originally sent. Repeated messages are charged double the ordinary rates. The words "Repetition paid," must be inserted immediately after the address, and charged for.

Should the RECEIVER of an ordinary message require it to be repeated, on account of supposed error, the application for repetition must be addressed to the sending station. Such application and repetition must be treated as two distinct messages, and be prepaid by the applicant. Should an error be discovered, the charges for the application and repetition will be returned.

RULE 6.—*Code Messages*—by which are meant messages constructed, for purposes of secrecy, of disjointed sentences, or words rendering the meaning unintelligible—will be transmitted with every possible care; but the telegraph companies, while willing to investigate by post complaints, respecting errors in such messages, will not return the charges upon them, unless they be "Repeated messages." (See rule 5).

RULE 7.—*Cypher Messages*—by which are meant messages consisting of letters, grouped or otherwise, not forming any known or dictionary words, or of numerals, are counted thus: Add together all the characters, figures, letters and signs employed in the cypher text; divide the total by five, and charge each five and fractional remainder as a word. To the number of words thus obtained, add the address, signature, and any ordinary words contained in the message. CHARGE DOUBLE the ordinary rates for these messages.

RULE 8.—*Government Messages.*—American, English and French Government messages will be charged half rates between New York and Great Britain or France; that is—messages in plain language, will be charged half ordinary public rates, and messages in cypher, half cypher rates. Beyond New York and beyond Great Britain and France, full rates must be charged.

Messages of other Governments will be charged full rates.

RULE 9.—*Characters.*—Note the following characters, used by the Cable Companies:

For a horizontal dash, ——— - - - - ———

For a perpendicular dash, - - ——— ———

RULE 10.—*Complaints.*—All complaints respecting irregularity in transmission or delivery of messages, must be made by the sender, in writing. In cases of delay or error, the complaint must be accompanied by the receiver's copy of the message. In cases of non-delivery, a statement in writing from the person to whom the message was addressed, to the effect that the message has not been received, must be furnished with the complaint.

Managers are specially instructed that all claims for refunding

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of tolls on cable messages, must be forwarded to the Secretary, at New York, with statement of complaint, as above. The tolls will in no case be refunded, without instructions from headquarters.

The following notice is appended to the Tariff Sheet of the Anglo-American Telegraph Company (limited):

NOTICE.—The public are informed that the Anglo-American Telegraph Company (limited) will not incur or accept any liability whatsoever, either for the due transmission of telegrams to the cable, or for their safe delivery at their destination; nor will they except any liability arising from delay or stoppage, by reason of any accident to the cable or instruments. The Company will not consent to be liable, under any circumstances, for any sum whatever, as damages or otherwise, for loss resulting from errors, mistakes, delays or other causes, in respect to any message intrusted to them, beyond the return of that portion of the charge accruing to the Company, out of the amount received, and then only in case the message should fail in transmission, when in the hands of the Anglo-American Telegraph Company (limited).

TARIFF TO PLACES BEYOND GREAT BRITAIN AND IRELAND, AND FRANCE.

On messages going beyond Great Britain, Ireland and France, charge the following rates, in gold, IN ADDITION TO THE TARIFF TO FRANCE:

For Twenty words or less.

To	ORDINARY CONTINENTAL RATES	RATE *via* FALMOUTH.
Aden	$15 00	$15 00
Algeria and Tunis	2 00	3 62
Austria and Hungary	1 50	4 38
Baden	1 50	4 12
Bavaria	1 50	4 12
Belgium	84	4 38
Benghazi	7 50	7 50
China, *see* Hong Kong & Shanghai,	.....	.....
China, Post Galle (Postage 37 cents extra)	23 50	23 50
China, Post Singapore (Postage 37 cents extra)	27 50	27 50
Channel Islands	1 66	.....
Cochin China (Saigon)	29 25	29 25
Corfu	2 50	4 38
Corsica	1 04	.....
Cephalonia, Ithaca and Zante, *via* Corfu	3 62	5 50
Cephalonia, Ithaca and Zante, *via* Volo	2 62	.....
Crete—Canea and Retimo	.....	6 62
Cyprus	.....	6 00
Denmark	1 25	4 50
Egypt—Alexandria	7 50	7 50
Egypt—Cairo and Suez	8 50	8 50
Egypt—Suez Canal	9 00	9 00
France	.....	4 38
Gibraltar	.....	2 75
Greece	2 25	.....
Greece, *via* Corfu	3 34	5 25
Greece, *via* Volo	.....	4 50
Holland	1 00	4 38
Hong Kong	85 00	21 50
Kong Kong, *via* Russia	21 50	.....
Hong Kong, *via* Teheran	24 88	.....
Italy	1 88	3 75
India—Kurrachee, and all stations in Baludschistan	22 50	22 50
India, west of Chittagong	23 50	22 50
India, east of Chittagong & Ceylon	23 50	23 50
Japan (Nagasaki)	46 25	26 50
Japan (Nagasaki), if addressed "*via* Russia,"	26 50	.....
Japan (Nagasaki) if addressed "*via* Teheran,"	32 75	.....
Java—Batavia and Welter Vreden,	30 50	30 50
Java—Stations west of Samarang,	30 75	30 75
Java—Stations east of Samarang	31 25	31 25
Luxembourg	1 50	4 50
Malta	2 50	2 50
Mytelene	.....	5 75
North Germany	1 50	4 38
Norway	1 70	5 00
Penang	23 50	23 50
Persia including Bushire	6 12	6 12
Portugal	2 00	2 62
Rhodes	.....	5 75
Roumania	1 88	4 50
Russia, in Europe	2 50	5 38
Russia, Caucasus	3 00	.....
Russia, Siberia—1st Region	4 00	.....
Russia, Siberia—2d Region	5 62	.....
Samos	.....	5 75
Scio	.....	5 75
Servia	$1 62	$4 50
Shanghai	41 25	21 50
Shanghai, if addressed *via* Russia	21 50	.....
Shanghai, if addressed *via* Teheran	27 75	.....
Shet'and Island—Moss Bank, Culla Voe, Uga Sound, Baltic Sound	50	.....
Singapore	27 50	27 50
Spain	1 75	3 12
Sweden	1 75	5 00
Switzerland	1 46	4 00
Syra (Greece), *via* Corfu	.....	5 88
Tripoli	5 62	5 62
Turkey in Europe	2 25	4 50
Turkey in Asia, Seaports	3 88	5 38
Turkey in Asia, Inland	3 88	6 12
Wurtemburg and Hohenzollern	1 50	4 12

For each ten, or fraction of ten words above twenty, charge, in addition, one half of above rates.

Charge the "Ordinary Continental Rate," unless specially instructed by the sender to transmit "*via* Falmouth."

Postage from any point 37 cents extra.

The words "*via* Falmouth," "*via* Russia," and "*via* Teheran," will be charged for only to London; but other instructions, as "*via* Corfu," will be charged to entire distance.

Messages for points in Japan, other than Nagasaki, must be addressed, "Post Nagasaki." (No postage.)

Messages for China and Japan will be forwarded by Falmouth or Russian lines, unless specially directed *via* Teheran or *via* Turkey. In the former case the Teheran rate, and in the latter the "ordinary continental rate" will be charged.

RULES.

(THESE RULES GOVERN THE ADDITIONAL CHARGE BEYOND FRANCE).

All compound names, including names of Countries, States, etc., and compound words, count for as many words as they contain.

Two pence, three pence, etc., count as two words in each case.

The Continental Telegraph Companies will not entertain or investigate complaints of error or delay in *unrepeated* messages.

The "Station from" must in all cases be inserted and *paid for* in messages for points beyond Great Britain and Ireland.

Messages for India and beyond require signature.

In all other respects the rules for business with Great Britain will be observed.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
June 1, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since May 15, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

140 Armstrong Run, Pa., re-opened,
Black Hawk, Col., tariff same as Central City, Col.,
201 Brownhelm, O.,
447 Belton, Mo.,
377 Cone, Iowa,
Cloverdale, Cal., tariff same as Healdsburg, Cal.,
181 Caldwell, O.,
60 Easton, Md.,
329 Eldorado, Ill.,
211 Graytown, O.,
456 Grasshopper Falls, Ks.
66 Girardville, Pa., heretofore another line office.
348 Irving, Ill.,
490 Ledbetter, Texas,
59 Lincoln University, Pa.,
181 Macksburg, O.,
211 Martin, O.,
467 Oswego, Ks.,
409 Palestine, Mo.,
480 Palestine, Texas,
85 Phenix Sta. Md.,
95 Quantico, Va.,
60 Ridgely, Md.,
260 Saugatuck, Mich.,
478 So Canadian, Ind. Terr.,
43 Tuckerton, N.J.,
181 Whipple Run, O.,
270 Warrens, Ind.,
* Yosemite Valley, Cal., re opened.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.		*Leaves this Line.*
Yosemite Valley, Cal.	50	5	Sonora, Cal., check San Francisco, Cal.

OFFICES CLOSED.

Acquia Creek, Va., Dublin, Va., Highland, Texas, Opdyke, Ill., and Rankin, Mo.

GENERAL INFORMATION.

The attention of managers of all *except "Offices having Special Sheet A"* is called to the fact that half rate messages *should not* be taken for or received from offices of the N. W. Telegraph Co.

Offices having "Special Sheet A" will take half rate messages as directed in order of February 20, 1870 which provides that half rate messages shall be taken for and received from, La Crosse, Wis, Winona, Minn., Wabasha, Minn., Lake City, Minn., Reed's Landing, Minn., Hastings, Minn., Red Wing, Minn., Stillwater, Minn, St. Paul, Minn., Minneapolis, Minn., St. Anthony, Minn., and Prescott, Wis.

Shelby Iron Works, Ala., new office in last JOURNAL, with "Tariff for Other Lines," 50 and 5 Columbia, Ala., should read 50 and 5 Columbiana, Ala.

Hereafter the "Tariff for Other Lines" from Salt Lake, Utah, to Bullionville and Pioche, Nevada, will be 150 and 15.

The name of the office heretofore known as Huron, Mich., has been changed to Rockwood, Mich., and that of Berlin, O., changed to Ceylon, O.

OFFICES HAVING "SPECIAL SHEET A"

Will hereafter check Staunton, Va., 15 cents more than "special rate" to Charlottesville, Va., and Somerville, Mass., 15 cents more than "special rate" to Boston, Mass., and Girardville, Pa. same as "special rate" to Pottsville, Pa., present rates not to be increased.

WILLIAM ORTON, Pres't.

TRANSFER SERVICE.

EXECUTIVE OFFICE
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, May 27, 1872.

On and after June 10th, *Whitehall, N. Y.*, will be added to the list of Money Order Offices.

J. C. HENDERSON, Transfer Agent.

G. H. MUMFORD, Vice-Prest.

BORN.

RIDER.—May 9, 1872, to E. Rider, Manager W. U. Telegraph Office, Meriden, Conn., a daughter.

MANNING.—May 11, 1872, to William A. Manning, of the W. U. Telegraph Office, Cleveland, O., a son.

TRAXLER.—May 21, 1872, to D. H. Traxler, Operator W. U. Telegraph Office, Wilmington, N. C., a daughter.

MARRIED.

WENTWORTH—READ.—At Malden, Bureau Co., Ill., April 24, 1872, by Rev. J. D. Baker, James P. Wentworth to Miss Mary Read.

CHRISTY—GREEN.—At Jamesville, N. Y., May 2, 1872, by Rev. J. W. Watson, Charles H. Christy, Manager W. U. Telegraph Office, to Miss Augusta E. Green. Both of Jamesville.

HOWIE—JACK.—At Detroit, Mich., May 2, 1872, by Rev. Mr. Milligan, D. M. Howie, Manager W. U. Telegraph Office at Pewamo, Mich., to Miss E. T. Jack, of Hamilton, Ont. No cards.

MOORE—WARD.—On Tuesday, May 7, 1872, at St. Marks Episcopal Church, New Milford, Pa., by Rev. J. A. Jerome, L. E. C. Moore, Manager W. U. Telegraph Office, Wilkesbarre, Pa., to Miss F. M. Ward, of New Milford, Pa.

OWEN—WOOD.—May 8, 1872, at St. Marks Church, Brunswick, Ga., by the Rev. Thomas J. Stanley, of Savannah, Ga., Mr. D. G. Owen, Manager W. U. Telegraph, to Miss Katie J. Wood. Both of Brunswick.

MARSH—MCELHANEY.—May 16, 1872, at Pittsburgh, Pa., by Rev. Mr. Johnson, Mr. Francis Marsh, Manager W. U. Telegraph Office, McDonalds, Pa., to Miss Lizzie McElhaney, of McDonalds. No cards.

TRANTWINE—SMITH.—On Thursday, May 23, 1872, in the First Moravian Church, Philadelphia, John C. Trantwine, Jr., Operator for Morris, Wheeler & Co., to Lucy L. Smith, formerly Manager of Lebanon, Pa., Office.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 14. NEW YORK, JUNE 15, 1872. WHOLE NO. 111.

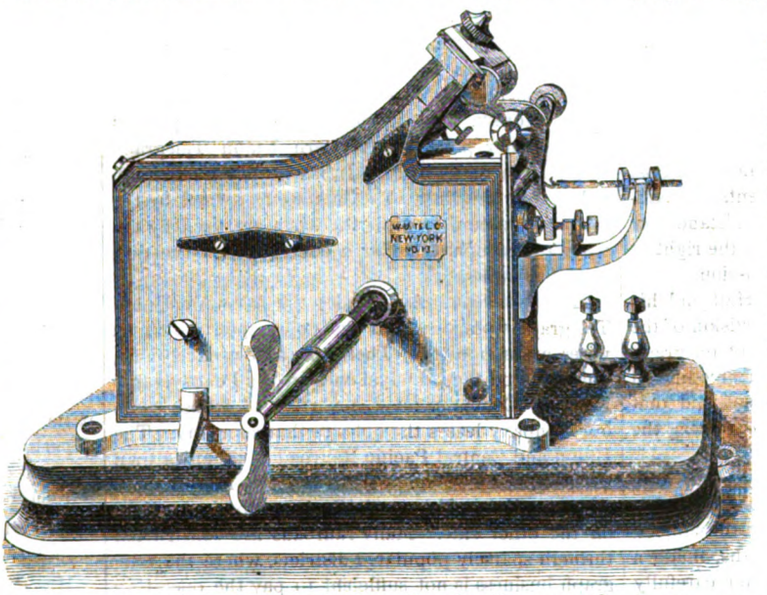
NEW SPRING REGISTER.

The accompanying cut illustrates the new Morse Main Spring Register, designed by Mr. G. M. Phelps, and adopted as the standard recording instrument by the Western Union Telegraph Company.

The wheel work is entirely enclosed by the combined glass and brass frame, and the pivot holes are also covered so as to keep the instrument entirely free from dust. An extra wooden roller is attached for greater convenience of starting the paper. The paper has simply to be inserted between the wooden roller, and the guide over it, and pressed forward while the register is in motion, when it will feed through without difficulty. The rate of speed may be varied by removing the glass at the end of the case, and turning the screw under the governor.

It is not designed that the operators should take out the pen lever. When the pen requires adjustment it should be turned up or down by its milled head.

When the instruments are sent out from the factory, they are oiled, adjusted, and ready for use, and are consequently admirably adapted for operators of limited experience, who are obliged to use paper for receiving.



A NEW AND SIMPLE CONTINUOUS BATTERY.

Professor Bottomley, of the Glasgow University, thus describes a new battery in use in that institution:

A shallow wooden tray, square and with slightly slanting sides, is lined with sheet lead; and this, after being electro-typed with copper, forms both the containing vessel for the liquids and the copper plate of the cell. Copper trays were used at first, but they were soon eaten through by the solution. The lead is not attacked at all. The length of a side of the lead tray is 21 inches, and its depth is 3¾ inches. In each corner is set a small block of wood 1¼ inches high. The zinc plate, which is like a square gridiron, rests at its corners on these blocks. The zinc has parchment paper tied round its lower surface and sides. The cell is filled up with saturated solution of sulphate of zinc, and crystals of sulphate of copper are dropped in, when required, round the edges outside the parchment paper. For connecting these cells together in series, the lead lining is carried over the wooden tray at the corners and down the outside to the under surface of the bottom of it. Here it is soldered to a small square of thick sheet tin. The cells are piled up one on the top of the other, the tin plates of the second cell resting on the first, and so on. The tin connections—a suggestion of Mr. Varley—are most excellent. The resistance of each of these cells is on an average 0·19 of an ohm. They are now used at all the telegraph stations where Sir William Thomson's siphon recorder is employed.

In using these batteries in a laboratory, where they are not perpetually at work, the best way of managing them may possibly be not to charge them with sulphate of copper except when they are about to be used, and only to put in as much as will do the work required. To calculate the quantity is easy; and any small excess might be worked off through a low resistance. We have been keeping them at work almost night and day. They require no attention except to be occasionally supplied with sulphate of copper crystals, and to have the sulphate of zinc that creeps up over their edges wiped away with a cloth.

At present our battery is tested very frequently, generally once in four or five days. The electromotive force and the internal resistance of each cell is determined. We have now had the greater number of the eighty cells in action for three months, and some of them for five or six months. During all that time they have been most satisfactory, the electromotive force of them having remained perfectly constant.

SECONDARY BATTERIES.

It is well known how the Leyden jar discharges, in one strong spark, the sum of electricity it received from the electric machine. M. Planté connects a somewhat analageous apparatus with the voltaic pile. Two plates of lead (20in. long by 8in. wide) are rolled up in spiral, being separated from each other by a few strips of india rubber. This spiral is placed in a jar containing acidulated water, and having a gutta percha cover, on which are fitted binding screws connected with the plates. Twenty such elements are placed in two rows of ten each, and charged from the primary battery, which consists of two Bunsen couples. By means of a commutator of peculiar construction, these secondary elements may be connected either for quantity or for intensity. When the elements are joined in series, an electromotive force equal to thirty Bunsens is obtained, giving a current by means of which platinum wire may be fused.

In the secondary couples, the chemical action generating the current is the reaction of hydrogen on peroxide of lead, the current from the primary pile, having caused decomposition of the water, oxidizing one of the plates and developing hydrogen on the other.

By the above arrangement, the quantity of electric work from the direct action of the primary pile is transformed by condensation. This case is somewhat similar to that of a hydraulic press or crane. In a pile driver—*e.g.*, a heavy body, raised by degrees to a great height by a series of successive efforts, is then left to itself, and gives back at once the greater part of the work thus expended on it. So, when, after charging, the secondary circuit is closed, the sum of the accumulated chemical actions caused by the primary current is given out in the form of a very intense current of short duration. The effect, when the couples are joined for quantity, corresponds to the fall of a very heavy mass raised a small height; when joined for intensity, to the fall of a small mass raised to a great height. It is not difficult to see how these secondary piles may become of important use.

POSTAL TELEGRAPH.

Statement of MR. GEORGE B. PRESCOTT, *Electrician of the Western Union Telegraph Company, before the House Committee on Appropriations at Washington, April 23, 1872.*

MR. CHAIRMAN AND GENTLEMEN OF THE COMMITTEE: During the past six years various schemes have been devised for uniting the postal and telegraph systems of the United States. The first measure of this kind was proposed in the first session of the Thirty-ninth Congress, in 1865, by Hon. B. Gratz Brown, Senator from Missouri, who advocated the construction of Government telegraph lines, to be worked in connection with the Post Office, for the transmission of messages throughout the United States at a uniform rate of 3 cents per message. The result of Mr. Brown's efforts was the adoption of a resolution by the Senate calling upon the Postmaster General for information as to the expediency of making the telegraph a part of the postal system.

On the 2d of June, 1866, Hon. W. Dennison, the Postmaster General, after conferring with the various telegraph companies and experts in the United States, and ascertaining all the facts which he considered

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necessary to enable him to form an intelligent judgment upon the matter, made a report to the President of the Senate, of which the following was the concluding sentence: "As the result of my investigation under the resolution of the Senate, I am of the opinion that it will not be wise for the Government to inaugurate the proposed system of telegraphs as a part of the postal service, not only because of its doubtful financial success, but also its questionable feasibility under our political system."

No further efforts were made to secure the establishment of a governmental system of telegraphy in this country until 1868, when Hon. E. B. Washburne, Representative from Illinois, in the second session of the Fortieth Congress, introduced a bill for the construction of a governmental telegraph line, under the direction of the Post Office Department, between New York and Washington, to be operated, as far as practicable) by the employés of the Post Office, for the transmission of messages at 1 cent per word, exclusive of date, address, and signature, in addition to 3 cents for postage and 2 cents for delivery.

In the same session of Congress two other bills for the construction and operation of postal telegraphs were also introduced. One of these provided that Congress should grant to Mr. Gardiner G. Hubbard and his associates, an act of incorporation, under the name of the United States Postal Telegraph Company, and confer upon it the right to construct, maintain, and operate lines of telegraph over all post-roads within the United States and territories, and also providing for a partnership arrangement between the United States and the Postal Telegraph Company, by contract with the Post Office Department, under which the company was to be furnished with office-room, stationery, lights, and fuel, and to some extent with clerks, operators, and superintendents, at the cost of that Department, and in return for these advantages the company was to send messages at the rate of 25 cents, (of which the Post Office Department was to receive 5 cents), for distances of 500 miles, and of 50 cents for distances of one thousand miles, reserving, however, the right to charge extra rates for priority of transmission.

The third bill authorized James F. Hall and his associates, under the direction and supervision of the Postmaster General, to construct lines of telegraph between Boston and Washington upon any line of travel, and be protected in the use thereof, and that all necessary materials required for constructing the lines be imported free of duty.

These three bills were referred to the House Committee on Post Offices and Post Roads, which, after a thorough and exhaustive examination of the subject, extending over a period of nine months, made a report, in which they stated that, "after carefully examining and considering the propositions contained in all the bills and papers submitted to them, and giving much time to the hearing of parties interested for and against the several measures presented, they were of the opinion that neither of the bills ought to receive the approbation of Congress."

The full and explicit disapproval of the various postal telegraph schemes, both by the Postmaster General, in 1866, and by the unanimous report of the Post Office Committee of the House of Representatives, in 1868, was generally regarded as the probable termination of the project; but in the second session of the Forty-first Congress, December, 1869, it was again revived by Hon. C. C. Washburn, Representative from Wisconsin, as whose request the House authorized the appointment of a Select Committee on Postal Telegraph, which sat for several months listening to arguments for and against the several measures presented to them, but failed to agree upon a report. Two members of the committee, however, Messrs. Washburn and Palmer, presented reports, which were ordered to be printed and recommitted. Mr. Washburn's report strongly urged the necessity for the purchase of the existing lines, and the creation of a purely governmental telegraph, and a bill was introduced by him for securing this result.

Mr. Palmer's report advocated Mr. Hubbard's scheme, and was accompanied by his bill.

No further action was taken upon either of these bills, and the discussion of the subject of governmental intervention in the business of telegraphing was not again renewed until the present session of Congress.

Although all the facts and arguments which could be adduced in favor of the governmental acquisition, interference, or control of the telegraph have been ably presented, I think it must be conceded that they have hitherto failed to produce a conviction of the expediency of such measures in Congress, the public press, or any considerable number of private citizens.

As the subject has been so fully discussed heretofore, and now presents no new features of importance, I will not occupy your time with a restatement of the reasons why the Government should not intervene in the business of telegraphing, but invite your attention to the pamphlets which I have in my hand, containing the argument of Hon. William Orton, president of the Western Union Telegraph Company, on the bill to establish postal telegraph lines, delivered before the select committee of the United States House of Representatives in May, 1870, and to the remonstrance of the Western Union Telegraph Company against the postal telegraph bill, published February 13, 1872, as embodying the views of the company which I represent upon the subject now under consideration.

Mr. DICKEY. I would like to know what proportion of their poles the Western Union Telegraph Company actually owns. In my State the telegraph poles along the lines of railroads are owned by the railroad companies, while the wires are used by the telegraph company, under a contract with the railroad companies.

Mr. PRESCOTT. As a rule, the Western Union Telegraph Company own the poles upon which its wires are supported. There are a few exceptions, however, and the principal ones are the Pennsylvania Railroad Company, over a portion of whose route our company leases the poles of that company. The Union and Central Pacific Railroad Companies own the telegraph lines on one side of their road and the Western Union Telegraph Company own the lines on the other side. Many railroads are constructed through sparsely populated districts, where the telegraph business is not sufficient to pay the operating expenses, and in such cases the railroad companies contribute to the construction of the lines and aid in their operation, receiving as compensation a commission upon the public business which is done on them, besides doing their own business free.

The CHAIRMAN. Are half the telegraph poles owned by the railroad companies?

Mr. PRESCOTT. No, sir; only a small percentage of them. As a general rule, the poles furnished by the railroad companies are contributed to the telegraph company as an inducement for building the lines, and become the property of the latter.

The CHAIRMAN. How large a force of employés has the Western Union Telegraph Company?

Mr. PRESCOTT. It has 7,264 on its pay-rolls, but there are a good many others connected with it indirectly.

Mr. DICKEY. Is there any case where the railroad companies own the telegraph poles and where the Western Union Telegraph Company does not possess the right of way?

Mr. PRESCOTT. There are a few railroad companies which own their own telegraph lines and over whose routes the Western Union Telegraph Company does not possess the right of way, but on most of the railroads our company has secured the right of way by contract.

Mr. LINES. I would like to ask about what proportion of these contracts there is where there is any mention whatever made of the right of way as a consideration.

Mr. PRESCOTT. In all contracts the right of way is recognized and constitutes a material consideration.

Mr. DICKEY. The railroad company has got the right of way, and the telegraph pole is an incident of that right of way. The right of way must be in the railroad company?

Mr. PRESCOTT. Yes, the right of way is in the railroad company, and our company has never constructed a telegraph line upon any railroad without securing from it a right of way, except in the case of the Pacific railroads, where the right of way was conveyed to the company by act of Congress.

The CHAIRMAN. I suppose that the railroad companies have not in any case parted with that right of way, except temporarily?

Mr. PRESCOTT. The right of way is limited to the duration of the contracts, some of which are perpetual and others for a long term of years. Virtually we consider the grant of the right of way as perpetual. There is a marked difference between the relations of the telegraph and railroad companies in this country and England in this regard. In England to a considerrble extent, the railroad companies owned the telegraphs on their roads, and not only operated them for the performance of their own service, but sent and received messages for the public at rates fixed by the railroad companies.

In this country, on the contrary, the Western Union Telegraph Company, as a rule, owns and operates the telegraphs on the lines of the various railroads, and not only performs the public telegraph business but also that of the railroads. When the British government purchased the telegraph lines in the United Kingdom they had to purchase from the railroad companies their telegraph interests, and at the date of Mr. Scudamore's last report, there yet remained forty-four railroad companies in various parts of the country with whom the Post Office department had not made araangements as to the amount of compensation to be paid to them for the purchase of their telegraph interests.

Mr. DICKEY. Sometimes you have your offices together and sometimes have the same operator?

Mr. PRESCOTT. Yes; very generally. In many cases the employés of the railroad companies also act as agents of the telegraph and thus enable our company to maintain telegraph stations at places where the telegraph business would not pay the wages of an operator. Nearly all railroad telegraph operators receive and transmit public messages over the Western Union telegraph lines, the railroad companies receiving a commission upon such business. The result of this is not only to enable the Western Union Company to reduce the rates, in consequence of the saving in the expense of operating the lines by this co-operative arrangement, but also to approximate more nearly than they otherwise could to a uniform tariff of charges.

The CHAIRMAN. I wish to ask a question touching the amount of the telegraph business of this country. I have here the English report for the week ending March 23, 1872, and for the corresponding week last year. The number of messages sent in England for

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the week ending March 23, 1871, was 212,472; for the corresponding week of 1872, 273,643; being an increase over last year of 61,171. If this week is a fair average they are now sending messages in England to the number of 14,230,000 per annum, which is an increase of about 750,000 messages over last year.

Mr. PRESCOTT. No single week can be selected as a fair average for the year. A variety of causes may increase the traffic of one week over another. In Mr. Scudamore's report on the reorganization of the telegraph system of the United Klngdom, he states that the total number of messages forwarded in the nine months ending December 31, 1870, was 7,563,015. He also states that the heaviest week in the nine months was the week ending 23d July, when the war panic raised the number to 234,194, and that the lightest was the week ending 31st December, when the Christmas holidays brought the number down by 35,000 below the previous week. Undoubtedly there has been a large increase in the telegraph traffic in England during the past two years, but it must be borne in mind that there have been very large expenditures and great increase of facilities. On page 84 of Mr. Scudamore's report he states that the—

Total number of instruments in use on 31st August, 1870, was	4,153
Total number of instruments before transfer	1,869
Additional number under the Post Office	2,284

On page 85 is a schedule of 50 new circuits in course of formation, regarding which Mr. Scudamore says: "Large as the system now is, it will be far larger and afford far more accommodation when the new circuits, now in course of formation, are completed." These circuits embrace all the principal towns in England, Scotland, and Ireland. In Mr. Scudamore's report to the chancellor of the exchequer, dated June 3, 1871, he says:

The new wire circuits described at page 85 of my report are on the very verge of completion, but only small portions of them are as yet earning money. When they are open throughout, our revenue will immediately and largely be increased, for there is nothing more certain in telegraphic business than this, that the trade increases with the speed of transmission. I could furnish many illustrations of this, but one will, perhaps, suffice. For a long time we had no direct communication between London and Dundee, the messages being repeated at Edinburgh. The complaints of delay were great, and the complainants generally declared that they did not send half so many messages as they should send if the speed were greater. In February last, we contrived to give London direct communication with Dundee, and in the first week, the messages were doubled, and they have since gone on increasing. I could multiply instances with ease.

Undoubtedly all of the important additional circuits, above refered to, have long since been put in operation and are the principal cause for the great increase in traffic, for, as Mr. Scudamore truly observes, "*there is nothing more certain in telegraphic business than that the trade increases with the speed of transmission*," and the speed of transmission depends upon the facilities afforded.

The CHAIRMAN. Can you make an approximate statement of the percentage of increase of telegraphic business in this country?

Mr. PRESCOTT. The percentage of increase on the Western Union Telegraph lines since 1867 has been as follows: From 1867 to 1868, 8.9 per cent.: from 1868 to 1869, 23.8 per cent.; from 1869 to 1870, 15.4 per cent.; and from 1870 to 1871, 16.2 per cent. These are for the fiscal years beginning July 1. The increase in the number of messages sent over our lines during the past six months, as compared with the corresponding time last year, was 19.7 per cent.

The CHAIRMAN. That very large increase in 1868-'69 was probably the result of the consolidation.

Mr. PRESCOTT. There was no consolidation during this period, but a considerable increase in the facilities.

Mr. HUBBARD. Was that the year that you reduced your rates?

Mr. PRESCOTT. We have reduced our rates every year since 1866, but it was not during this fiscal year, but the next, that we made our greatest reduction, when the uniform square rates and the transmission of messages by night at half rates were introduced. The increase of the business during the year when these great reductions were made was only 15.4 per cent., while for the succeeding year, when there was no very material diminution in the rates, the increase was 16.2 per cent., thus demonstrating the fact that the increase in the number of messages is due more to the increase of facilities than to the reduction of rates, for during the last year there was a far greater increase in the means for rapidly performing the service than at any former period.

The CHAIRMAN. Have you anything corresponding with those weekly reports of the English Government, showing the number of complaints where mistakes are made?

Mr. PRESCOTT. We may not have anything exactly corresponding with to it. We keep a record of all the complaints which are made to our company of mistakes or irregularities in the service.

The CHAIRMAN. This report shows these facts: They keep an account of mistakes such as, "from delay in transmission;" "non-delivery;" "inaccuracies;" "overcharge;" "messages paid for and not sent;" or "twice paid for," and all other inaccuracies.

Mr. PRESCOTT. Our record of complaints is accurately kept.

Mr. DICKEY. But you have no account of mistakes where there is no complaint?

Mr. PRESCOTT. Not as a general thing, because we have no means of knowing that a mistake has occurred unless some one makes a complaint. When errors do occur we are very glad to be informed of them, so as to enable us to prevent a recurrence.

The CHAIRMAN. Here is a statement of complaints for the week ending March 23, 1872:

Total number of complaints for the whole kingdom	225
For corresponding week last year	317

I have been receiving these reports during the summer, and it has been a very curious thing to me to see how slowly but steadily the complaints have been decreasing.

Mr. PRESCOTT. The English government is managing the telegraph with a great deal of ability and success, and is improving the service very rapidly. Nearly all the skilled employés of the old companies are retained under the government, and there is no reason why, with unlimited resources in skilled labor and money, the system should not be equal to any in the world.

The CHAIRMAN. It indicates to me that during the past year they have very greatly bettered the postal-telegraph service, and it seems very remarkable to me that a thing done by the government should have so much efficiency, on the general principal that I believe private companies, or individuals, do work much better than a government can. It seems to indicate that the government in England is doing the work with remarkable accuracy.

Mr. PRESCOTT. That is true; but yet those statements do not afford conclusive proof that the number of errors is decreasing. Any person who suffers from a mistake made on our lines can obtain redress from us, or, if not satisffed with our treatment of his demands, can seek redress through the courts, and we are obliged to pay whatever damage is awarded. But if a mistake is made by Post Office telegraph in England the postmaster may refund the shilling paid for sending the telegram, but beyond this the complainant has no redress whatever, and no man has any redress under any government telegraph system. Now I cannot say what proportion of the English people would prefer a formal complaint for a shilling, but I am very confident that there is a very small proportion of the people who use the telegraph in this country who would take that trouble for so small a sum. While, therefore, the number of complaints reported by the Post Office department may approximately represent the number of errors made by the telegraph and show the ratio of improvement, it cannot be regarded as showing the maximum number. The complaints for errors and failures to deliver messages, in which damages have been claimed from our company during the past year, have amounted to only five hundred, or about ten per week.

Mr. PALMER. How much in amount has the Western Union Telegraph Company ever paid in the way of grievances? Can you give a general estimate of the aggregate amount?

Mr. PRESCOTT. During the past five years our company has paid $70,747.77, being an average of $14,149.55 per annum

Mr. DICKEY. I have brought several suits myself against the Western Union Telegraph Company.

The CHAIRMAN. (To Mr. Prescott.) Do you think that the Western Union Telegraph Company would be willing to take Mr. Hubbard's postal plan and execute it themselves?

Mr. PRESCOTT. I do not think the Western Union Telegraph Company would be willing to pay Mr. Hubbard the million dollars provided in the bill for organizing his company merely for the purpose of engaging in a business which they are already successfully performing; but with a few immaterial alterations in the bill I think our company would be willing to undertake the transmission of messages at the rates proposed by him.

Mr. Lines stated that the chancellor of the exchequer was very well satified with the price paid for the English telegraph lines. Now I have here Mr. Scudamore's report made to the chancellor of the exchequer on the 12th of July, 1871, in which he states that they had already paid for the British telegraph lines £7,518,955 for the plant. That would amount to nearly $40,000,000 for about as many miles of wire and only one-third as many miles of line as the Western Union Telegraph Company alone possesses, and yet Mr. Lines says he thinks $12,000,000 would buy all the telegraph lines in America.

Mr. LINES. That is admitting that the United States Government stand in the same relation to the telegraph companies. But I propose to show that they do not. What I read from Hansard was what the chancellor of the exchequer stated before it was ascertained how much money would have to be paid. It was when he supposed that twenty years' purchase would amount to £2,200,000.

Mr. PRESCOTT. Has there been official complaint since then that the British government paid too much?

Mr. LINES. I have read a pretty strong opinion of that sort from a member of Parliament.

Mr. PRESCOTT. You stated also that this was the only country where the telegraph lines were not under government control. Do you think that this is a true statement? Are not the telegraph lines in the Dominion of Canada, Newfoundland, and in some parts of Europe still under private control? Are not

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all the principal submarine telegraph lines in all parts of the world and owned and operated by private companies? If you were to send a message to-day from any part of America to China, Japan, or Australia, it would pass over the lines of private telegraph companies throughout the entire route, with a single exception of the line from Bombay to Madras. There is more private capital invested in telegraphs to-day throughout the world than there is governmental.

Mr. LINES. I do not know how to answer that unless Mr. Prescott produces some statistics.

Mr. PRESCOTT. I have the statistics here, and they are all open to your inspection.

Mr. DICKEY. I do not know that we have got the actual capital of the Western Union Telegraph Company. Will Mr. Prescott please state it?

Mr. PRESCOTT. The capital is about $41,000,000.

Mr. DICKEY. We had Mr. Orton's statement that the net profits of the company were about 30 per cent. of the gross receipts. How much are the gross receipts of the company?

Mr. PRESCOTT. The gross receipts of the company for the fiscal year ending June 30, 1867, were £6,568,925; for 1868, $7,004,560; for 1869, $7,316,918; for 1870, after we had made a great reduction in the day-rates and introduced the night system of half-rates, $7,138,737; and for 1871, $7,637,448. The net revenue for 1867, after paying the working expenses——

Mr. DICKEY. It does not include anything for construction?

Mr. PRESCOTT. It includes nothing for construction, nor for any other purpose than the operation and maintenance of our lines. The net receipts for 1867 were $2,624,919; 1868, $2,641,710; 1869, $2,748,801; and for 1870, after the great reduction in the rates and the introduction of the night half-rate system, $2,227,965. Here was a loss in the net revenue of over half a million dollars in a single year, while, if the rates had not been reduced, the natural increase of the business would have increased the net revenue by at least $200,000. The net receipts for 1871 were $2,532,661, being a decrease from 1869, before the great reductions in the tariff, of $216,140, and a decrease from 1866-'67 of $92,258.

Now, during this time we nearly doubled the number of messages sent over our lines, and, in order to satisfactorily handle this great increase in the traffic we were obliged to add very largely to our plant, as will be seen by a statement of the number of miles of wire annually owned by the company. In 1866 we had 75,686 miles; in 1867, 85,291; in 1868, 97,594; in 1869, 104,584; in 1870, 112,191; in 1871, 121,151. Thus, from 1866 to 1871, there was an increase of 45,465 miles of wire, or about 60 per cent. We have also during this period expended about $2,000,000 in the reconstruction of our lines, so as to greatly increase their working capacity.

Mr. DICKEY. Is there anything that will show how much of that was an extension of your business, and how much of it was absorption of rival lines over the same routes?

Mr. PRESCOTT. The only absorptions by our company during this period were the Caton lines, in Illinois, and a line between Washington and New York, which was sold at auction to pay the debts incurred in working it, and which came under our control last year.

Mr. CLARK. What line was that?

Mr. PRESCOTT. The Bankers and Brokers'. Those are the only lines of importance which came into our possession by lease or purchase during that time.

Mr. HUBBARD. And the California lines?

Mr. PRESCOTT. The California lines came in previously.

Mr. CLARK. And the lines of the American and United States companies?

Mr. PRESCOTT. They were consolidated with the Western Union Telegraph Company in 1866, and are included in the statement already given for that year. During the past six years we have put up over 60,000 miles of new wire, which is a quarter more than the increase in our wires shown by my recent statement, notwithstanding the absorption of the Bankers and Brokers' and Caton lines. Every year we are compelled to replace a considerable amount of wire which has become worn out.

Mr. DICKEY. That is repair?

Mr. PRESCOTT. Yes, that is repair, although it is generally termed reconstruction. That reminds me that Mr. Scudamore places this kind of repair to construction account. In his report, dated July 12, 1871, he says:

The analysis of our accounts for the fourteen months ending the 31st March last, is not sufficiently advanced to enable us to state positively the exact proportions in which the total sum expended should be distributed between capital and revenue. Throughout the fourteen months, we have constantly had large gangs of men engaged, at one and the same time, in putting in order the property which we have bought and in constructing fresh lines, (the cost of which, two operations is properly chargeable to capital,) and in ordinary maintenance work, such as the repairs of casual damage, the taking off of faults, and other work of the kind, the cost of which is properly chargeable to working expenses. We could not avoid this in the first year of our work; but our reconstructions are now nearly complete, and when our present scheme of constructions, which are also approaching completion, is finished, further constructions will no doubt be provided for by annual vote.

Mr. Scudamore has apparently yet to learn that reconstruction, like construction, is something which is never finished. A telegraph line is scarcely built before decay begins; and its reconstruction is as necessary an item to be considered and provided for as the ordinary working expenses of the wire.

If the Western Union Company should charge its repairs to construction account, it would apparently increase the net revenue over three-quarters of a million of dollars annually.

The CHAIRMAN. Do you doubt the correctness of the report of the chancellor of the exchequer, that the net profits for the last year were £50,000?

Mr. PRESCOTT. I have not seen the report you allude to.

The CHAIRMAN. I refer to the statement made in a cable dispatch, given some weeks ago.

Mr. PRESCOTT. I do not question the accuracy of the report of the chancellor of the exchequer, or of any other British official; but I think, in making up their telegraph accounts, many important items which we should charge to ordinary working expenses the British post-office telegraph carries to construction account, and thus their net revenue is made to appear greater than the facts warrant. I have here Mr. Scudamore's report to the chancellor of the exchequer, dated June 3, 1871, which includes a statement made by George Chetwynd, receiver and accountant general, showing the amount of telegraph revenue collected from the commencement up to March 31, 1871, and the expenditures for the same period. The total receipts are stated at £798,580, and the total expenditures as £1,397,389. The expenditures are divided into two classes, namely, capital expenditure £926,894, working expenditure £470,495.

Under the head of capital expenditure are £346,794 for poles, arms, wires, insulators, instruments, batteries, and tools, none of which items are to be found under the head of working expenses. And yet, how could a telegraph of the magnitude of the British system be worked fourteen months without requiring a heavy necessary outlay for these articles irrespective of construction?

Under the head of capital account £377,449 are also placed for engineering salaries and traveling expenses, alteration of buildings, preliminary instruction, bonuses to learners, office-fittings, examining accounts of telegraph companies, law expenses, &c., none of which items appear under the head of working expenses, although just such expenses must continue to be made every year as long as the telegraph is maintained.

Now, I do not doubt the correctness of these figures at all, but I think a considerable portion of them would be much more properly placed under the head of working expenses than capital account. This matter of the proper division of the expenditures, however, I regard as of small importance. There is no reason why, at the rates charged, the English telegraph should not be self-sustaining ultimately, if it is not now; and there is no room for doubting the fact that it has greatly improved since it passed under the control of the government. The opening of 1,350 new offices and the erection of 30,000 or 40,000 miles of wire could not fail to vastly improve the capacity and value of the system. The plans adopted by Mr. Scudamore for carrying out the work were admirable, and evince great judgment and ability on his part. The work of reorganization and extension was intrusted to the officers of the companies which were bought out, and the position of engineer-in-chief of the post-office telegraphs was given to Mr. Culley, the former electrician of the Electric and International Telegraph Company. While I see no reason, therefore, why the British post-office telegraph system should not equal any other in the world, I do not consider its success as in any manner due to its subordination to the post-office authorities, but regard it as mainly due to the unification of the system by uniting all the lines under one control, and by the extension of its lines so as to afford prompt telegraph communication between all parts of the United Kingdom. The reduction of tolls in Great Britain since the lines were placed under control of the Government has been no greater than in this country, since October, 1869.

The tariff between London and many important places where the bulk of the business was done was a shilling before, while the rates throughout the metropolis have been raised by the government from sixpence to a shilling per message. The advantage of having a uniform rate is indisputable, and in small compact countries can be maintained without difficulty, but in a country so extensive as the United States it would be impracticable, except at rates which would be unsatisfactory to those who wished to send over short distances.

Mr. HALE. You have given your gross receipts and your net receipts; what were your dividends during those years?

Mr. PRESCOTT. The Western Union Company has not made any dividend since January, 1870. The dividends, when they were made, were two per cent. semi-annually. Occasionally the dividend was passed. The company has never paid over four per cent. since 1866.

Mr. DICKEY. I recollect when I got four per cent. a quarter.

Mr. PRESCOTT. Not for the Western Union Telegraph Company, I think. I have been a stockholder in the company for eight or nine years, and I never got any such dividend as that.

Mr. DICKEY. I don't speak of that being the dividend on the capital stock, but on the cash put in.

Mr. HALE. What is the stock selling at?

Mr. PRESCOTT. It was selling at 76 yesterday.

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Mr. HALE. What was it selling at two years ago?

Mr. PRESCOTT. I think it sold from 35 to 40.

The CHAIRMAN. How is it that the prices have doubled within two years when there has been no dividend?

Mr. PRESCOTT. It is evident enough that if we make a profit of $2,500,000 per annum and, instead of paying dividends, put the earnings into new lines, the stock ought to become more valuable.

The CHAIRMAN. Not for the stockholders.

Mr. PRESCOTT. That depends upon how long the stockholder keeps his stock.

The CHAIRMAN. It may be that there will be a pretty big dividend to come. Do you know whether anything of that sort is intended?

Mr. PRESCOTT. It would not surprise me if there should be, although I do not pretend to know anything about it. As for the reasons for the fluctuations in the price of stock, you might as well ask me why Erie sold at 18 two years ago and 65 now.

The CHAIRMAN. I think that the Erie Ring and the late explosion explain that.

Mr. PRESCOTT. I bought Western Union Telegraph stock at par seven years ago and hold the same certificates now. There have been no stock dividends since, and yet the actual property value has been very greatly enhanced by the construction of new lines and the reconstruction of the old. The temporary depression of the stock two or three years ago was no criterion of its value, as the action of the present investors clearly shows.

Mr. LINES. I would like to ask Mr. Prescott whether he is perfectly satisfied that there will be no redress under the management of the Post-Office for malfeasance in any of the telegraph employees?

Mr. PRESCOTT. I do not know what sort of justice might be dealt out to the employés of the Post Office, but I am very sure that the public would have no remedy.

Mr. LINES. Cannot there be action in court for the malfeasance of a postmaster, clerk, or operator?

Mr. PRESCOTT. Suppose you send a valuable letter through the Post Office and it is stolen by one of the employés? If the fact could be proven the employé would doubtless be punished, but that would not reimburse you for your loss, and you could not get any redress from the Department.

Mr. DICKEY. Mr. Prescott is correct about that.

Mr. PRESCOTT. I do not consider it necessary at this time to criticise Mr. Hubbard's argument in favor of his bill, but I deem it proper to say that the greater portion of his remarks relating to our company are incorrect, and that there is no foundation, in fact, for any of the following statements, viz.:

1. That the rates at the West are twice as high as those at the East.

2. That the rates are higher between the principal cities now than they were six years ago.

3. That the amalgamation of the United States and the Western Union Companies raised the rates in many parts of the country, and they have never been reduced between the large cities.

4. That the Western Union Company has raised the rates so as to crush out more than one newspaper.

5. That the Western Union Company has issued notice to exclude any paper from receiving news which undertook to criticise it.

6. That within a year this company has cut off a paper for criticising reports.

7. That commercial news is sent over our lines to the exclusion of all other business, by priority.

I have already stated that the rates have been constantly reduced every year since the consolidation of the United States and American lines with the Western Union, in 1866. In no instance was that consolidation followed by an increase in the tolls. As our gross revenue for 1871 shows an increase over that of 1869 of less than 5 per cent., while our net revenue decreased in the same time over 8 per cent., how can Mr. Hubbard's statement, that we have doubled the number of messages transmitted, be reconciled with his assertion that we have only reduced our rates from 15 to 20 per cent.? Of course, if we have doubled our business and only decreased the rates 20 per cent., our gross revenue should show an increase of 60 per cent. instead of 5.

A great deal of importance has been attached to the proposition to unite the postal and telegraph systems of the country, and European experience is referred to as evidence of the benefits to accrue from such a union; but while it is true that the aerial telegraphs in continental Europe are, for the most part, owned and controlled by the governments of the respective States through which they run, the assertion that they form a part of the public postal system is erroneous. England is the only country in Europe where the telegraph and postal systems are united. In North Germany, which comprises twenty-two states, the administration of the telegraphs constitutes a distinct department under the government of the confederation, Major General De Chauvin being director general of telegraphs, assisted by ten directors, having their headquarters at Berlin, Breslau, Cologne, Dresden, Frankfort, Halle, Hamburg, Hanover, Kœnigsberg, and Stettin. The telegraphs in Austria, Hungary, Bavaria, Würtemberg, Baden, and Holland form one system under the head of the South German Telegraph Union, and in the several States are managed as distinct departments by their respective directors general. In Russia, France, and Spain, the telegraphs constitute a distinct department under the minister of the interior; in Belgium, Italy, and Portugal, under the minister of public works; in Denmark, Norway, and Sweden, under the Minister of Finance; and in Switzerland the administration of the telegraph constitutes a distinct department under the federal council. In fact, in all the continental countries of Europe the telegraph constitutes a distinct department, and, although the post office, railways, and customs, as well as private establishments, supply the elements of an auxiliary staff, all the persons employed in the transmission and delivery of the telegrams depend upon the administration of telegraphs for their compensation, and in the annual budgets appropriations are made for that service distinct from the post.

As, therefore, none of the telegraph systems in continental Europe are under the control of or are united with the Post Office departments, all considerations of value or experience based upon the theory of such a connection should be eliminated from any estimate which may be made in reference to the proposed union, in whole or in part, of the telegraph and postal systems in the United States.

The question, however, as to what department of the government the telegraph is attached is of no great importance. It is a service in every branch of which skilled labor is required, and whether it be under the control of the minister of the interior, finance, public works, or the postmaster general, it can only be successfully managed and operated by telegraphists especially educated for this peculiar service. Whether the telegraphs are as well managed in Europe under the various governments as they might be, or as they probably would be in those countries by private companies, I do not feel called upon to discuss. Neither do I regard the extent of the telegraphic facilities furnished in Europe, or the price at which messages are transmitted, as of any particular consequence in considering the comparative merits of governmental and private control of the telegraph, since the government may send messages at any tariff it chooses to establish, and furnish such facilities as it deems best, totally irrespective of the important question as regards private companies as to whether the revenue shall equal the cost of the service.

I think, however, I may very properly compare the telegraphic facilities furnished in Europe under governmental control with those in this country, where the construction and operation of the telegraphs have hitherto been left to private enterprise.

In Europe the telegraph system embraces 175,490 miles of line, 475,007 miles of wire, 21,146 sets of instruments, and 15,503 offices.

In America the telegraph system embraces 85,583 miles of line, 165,875 miles of wire, 8,655 sets of instruments, and 6,755 offices.

The ratio of telegraphic facilities to population in Europe is as follows:

Number of inhabitants to each mile of line	1,744
Number of inhabitants to each mile of wire	642
Number of inhabitants to each office	19,687
Number of inhabitants to each message sent	9½

The ratio of telegraphic facilities to population in America is as follows:

Number of inhabitants to each mile of line	486
Number of inhabitants to each mile of wire	250
Number of inhabitants to each office	6,161
Number of inhabitants to each message sent	$2\frac{25}{100}$

It will thus be seen that, as regards the facilities furnished in proportion to population, America is far in advance of Europe.

The tolls for the transmission of messages are not the same for any two countries in Europe, nor are they uniform for all classes of messages in any one country. Telegraphic correspondence in Europe is divided into two general classes, called internal and international messages. The internal messages are those which are received, transmitted, and delivered in the same country; the international messages are those which are received in one country and transmitted into another. As a general rule, a low rate of charges is adopted for the transmission of internal messages, while a higher tariff is imposed upon international messages.

The telegraphic tolls in continental Europe in 1869 averaged 36 cents for internal messages, and $1.01 for international messages, which is a higher average charge than is imposed in this country, although it is well known that skilled labor is much more expensive here than in Europe.

The Western Union Telegraph Company has for the past six years been successfully striving by the improvement of its lines and machinery and by the employment of the most skillful operators, to secure the most prompt and satisfactory telegraph service in the world, and I believe the results will show upon investigation that it has fully succeeded.

The claim that the Western Union Telegraph Company is now, or may hereafter become, a dangerous monopoly is entitled to no consideration whatever, since, in the first place, the telegraph business is everywhere in this country open to free competition, no one company having any advantage over another, except what it legitimately acquires by the greater skill with which it performs the service; and, in the second place, the act of 1866, which constitutes a compact between the Government and the Western Union Telegraph Company, provides that the United States may at any time, after the expiration of five years from the date of the passage of the act, purchase all the telegraph lines, property, and effects of the company at an appraised value, to be ascertained by competent disinterested persons, two of whom shall be appointed by the Postmaster General of the United States, two by the company, and one by the four so previously selected.

In conclusion, permit me to say that as the success of Mr. Hubbard's scheme would inevitably depreciate the value of the property of this company, which the Government can at any time take at an appraisal, not of its cost but of its value, I submit that Congress cannot consistently and in good faith confer such a franchise upon Mr. Hubbard without first releasing this company from the obligations of the above act, and providing a just measure of compensation for the depreciation of its property which would result from the granting of such extraordinary privileges to a competitor.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JOURNAL OF THE TELEGRAPH.

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, JUNE 15, 1872.

JAMES GORDON BENNETT *VERSUS* THE TELEGRAPH.

In editorially announcing the recent death of its founder and proprietor, JAMES GORDON BENNETT, the New York *Herald* says: "He was ever ready to give his earnest and powerful aid to the establishment of Steamship Lines, Railroads, and Telegraphs, which he recognized as the great missionaries of civilization, and the life-blood of a perfect daily newspaper."

As to the late Mr. BENNETT having been a patron in the establishment of Steamship Lines and Railroads, we have no knowledge, and therefore will raise no question. But as to his merits as a promoter in the establishment of the TELEGRAPH, we propose to submit the following well known incident, which will enable our readers to judge with reasonable certainty:

It will be remembered that the first line of Telegraph established in the United States, was the experimental line between Washington and Baltimore, for which the means was furnished by Congressional appropriation out of the public treasury, which was completed in the spring of 1844. Farther Government patronage was prevented by the advice of the Postmaster General, who, in his report to Congress, declared his belief that the Telegraph, although an interesting experiment, could never become of practical value, and the very moderate offer of Prof. MORSE for the sale of his entire invention to the United States Government, was declined.

The only resource for its future development, was in an appeal to the enterprise of the business men of the country. In order to bring the invention to the attention of the business interests, Mr. EZRA CORNELL, (one of the founders, and still a director of the present WESTERN UNION TELEGRAPH CO.,) who had superintended the erection of the Washington and Baltimore line, opened for exhibition a short line of Telegraph in Boston. Finding but little encouragement in that city, the exhibition was soon abandoned there, and transferred to the city of New York, where an experimental line was opened in the autumn of 1844, for exhibition to the public. The line extended from 112 Broadway to a point just above the present Metropolitan Hotel. So little attention did this wonderful invention then receive, even at the modest admission fee of one shilling per head, that Mr. CORNELL and his assistant found it extremely difficult to maintain themselves in the most humble manner, upon the entire receipts of their exhibition. Sleeping upon the chairs in their exhibition room, they often found it necessary to go to bed supperless. Without the means of paying for advertising, the daily papers were besought to notice the exhibition editorially. Kindly notices were given by the *Express* and *Evening Post*, as well as some of the other papers of the day, but not a word could the *Herald* be induced to say. Finally Mr. CORNELL sought an interview with Mr. BENNETT, and solicited his attention. He was met by the very frank statement by Mr. B. that he was opposed to the success of the TELEGRAPH. In Mr. BENNETT's own words, he "had at great expense established his expresses in such manner that he could beat all of his rivals, and if the TELEGRAPH were once successfully established he would lose his advantage."

Within two years Mr. CORNELL had the proud satisfaction of demonstrating to Mr. BENNETT the value of his then mode of transmitting important news. During the year 1845, mainly by the efforts of THEODORE S. FAXTON and his associates of Utica, a company was organized for building a Telegraph line between New York and Buffalo. The section between New York and Albany was built under the superintendency of Mr. CORNELL, and was opened for business at the end of 1846. Governor YOUNG's annual message was transmitted to the Legislature the first Tuesday of January, 1847, at noon. At that hour a *Herald* messenger, with a copy of the message, left the Capital on horseback, provided with relays of fleet horses at short intervals. Riding at break-neck speed all night, he reached White Plains (to which point the Harlem Railroad was then in operation) the following forenoon, where a special locomotive was in waiting to bring him to the city. What was his surprise to meet at this point newsboys selling copies of the New York *Express* of that morning, containing GOVERNOR YOUNG's message in full, which had been transmitted by the despised TELEGRAPH. Thus Mr. BENNETT's enterprise was at a single blow completely annihilated, and the TELEGRAPH was successfully established in spite of his chilling indifference.

ON Thursday, June 13th, 2,155 messages were exchanged between New York and Boston. Of this number, Mr. Barrett sent with the Phelps printing instrument in seven hours 606 messages, being at the rate of over 86 messages per hour.

NOTICES of Marriages, Births and Deaths, must, if sent to us for publication, be authenticated by the name and address of the party sending them, or they will not appear.

HERE is a matter seemingly small in itself, yet involving an important issue. We give it to point out the necessity which exists for care and vigilance in the handling of business. In this case it is evident that both the sending and the receiving operators were at fault, though in different ways:

A telegram was left at the telegraph office in an eastern city, directed to "Chase, Stewart & Co.," New York. Owing to the poor manipulation of the key by the sending operator, the message was received as to "Chas. E. Stewart & Co." This, however, was not the only mishap. The operator who received the message put down the address as "C. E. Stewart & Co."

The result was that Chase, Stewart & Co. did not receive their dispatch, and it ultimately found its way to the hands of a wrong party, whose name in some degree was similar to their own.

The substitution of the initials for the full name, which in this case was undoubtedly sent, though not in a clear manner, was not a blunder. It was worse. It evinces negligence and carelessness. Such matters injure the reputation of the Company, and bring discredit upon the service.

IN another column we give a communication from "Buffalo," upon the delays to business and the extra service entailed upon the Company, arising from an unintelligent performance of duty, which is very suggestive, and worthy of general attention. Our correspondent takes a very proper view of the subject he discusses, and, doubtless, if all of those entrusted with the performance of the business of the Company evinced a like intelligence, and as just an appreciation of the proper fulfillment of their duties, the service would be greatly benefitted thereby.

In comment we would say, however, that as a general rule, operators should not take it upon themselves to alter the phraseology of a dispatch, or the spelling of a word, even if manifestly wrong; yet a wise and discriminating judgment would, if exercised, greatly aid in facilitating the transmission of such messages as are covered in the communication of our correspondent.

Many of the difficulties of this nature arise from—to place it in the mildest form—the inattention of the receiving clerk. It is the unmistakable duty of this person to be sure that he can read every word in a message tendered for transmission before he accepts it from the sender. Also, that if he perceives anything wrong in the message, to suggest in a polite manner, a correction. This can be done without giving offense, and generally to the satisfaction of the sending party. Were this done in every instance necessary, much, if not all of the trouble referred to, would be obviated.

To those sending us communications for publication, we would say: Write only upon one side of the sheet. When both sides are written upon, it causes annoyance to the printer, and some little trouble to ourself.

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CORRESPONDENCE.

FOLLOWING COPY.

BUFFALO, May 28th 1872.

To the Editor of the Journal of the Telegraph:

In your issue of May 1st, a member of the profession asks for a rule governing the transmission of misspelt words, *i.e.*, "following copy." In answer to the enquiry, the editor seemed to take the ground that the only safe rule for operators to follow was to abide by the copy and send messages *verbatim*. I for one would regret very much the establishment of such a rule, and I shall hope to prove by this article that it would be the means of increasing an already incalculable amount of confusion and mischief. The majority of the messages which are now "held" for "correction," are the result of this very habit, or implied rule, of "following copy," and I feel confident that you will agree with me that there is nothing so annoying or perplexing as the numerous "corrections" which already flood our offices, and take possession of the "circuits"—a too large share of the time; and I, therefore, assume that any means should be adopted which will guard against, or remedy, this most prolific and growing evil. My experience has taught me to believe that almost invariably the error is committed in the transmission of the message from its originating office. I claim that when the sender *knows* that the writer of the message has made a mistake, and does not seek to repair the error, he commits an act of gross negligence; and yet, such cases are of frequent occurrence. In the transmission of cipher, legal, or foreign messages, it is of course indispensable to follow "copy;" but I hold it to be arrant nonsense and the height of folly to send the word "salt," "*calt*," or "Chicago," "*Shiagow*," merely because the writer, who knew no better, has not written Websterian English. To start such a message as I have mentioned is to secure a vast deal of trouble and unnecessary delay; and if the destination is somewhat distant, by the time it reaches the person to whom it is addressed the misspelt words have been underscored in some repeating office, and the mystification is complete, for, upon its reception, the party for whom it is intended does not understand the message in its then present shape, but thinks it *must* be of unusual importance as it is emphasized and asks for a repetition; whereas, the emphasis (?) has been innocently added by some "knight of the quill" in his, or her anxiety to clear their skirts of the disgrace of having perpetrated a "bull." The message consequently goes back for repetition and correction, and a host of office messages, and delay by the wholesale, naturally follows. There should be a judicious and proper regard for what is termed common sense—great care and discretion must of a necessity be exercised in the reading and transmission of messages, and many errors which now occur would be avoided. One can imagine pretty clearly with what surprise the firm of Smith & Jones read a despatch saying, "your wife left on the evening train," and particularly amusing when neither Smith nor Jones are married, while Smith T. Jones is anxiously wondering why he receives no news of his wife's intended departure. Many such and similarly stupid mistakes have occurred, and will continue to occur unless operators consider themselves something more than a mere machine!

It may be urged, "Thats the way its written;" "The clerk ought to rewrite the misspelt words;" or perhaps some may say, that my remarks do not apply to actual practice. To the first I answer, we may much better repair the error before it has assumed greater proportions, and when it can be easily corrected or prevented, rather than be obliged to correct the mistake after much trouble and delay. Second, perhaps if the clerks were engaged in re-writing they would have but little time to perform their necessary and legitimate duties. Thirdly, my remarks *do* apply, and *will* until we operators do our share (easily accomplished) toward making the application unnecessary.

The beneficial results to be achieved by a course such as I have mentioned may be summed up as follows:—There will be fewer repetitions called for, less delay, and consequently better satisfaction guaranteed to the public. Less occupation of the wires for correcting mistakes, which ought never to have occurred, thus giving additional time for the transaction of more profitable business for our employers; and, finally, it will be a source of genuine comfort to see the "hooks" clear, comparatively, of bungled and incomplete messages, which are ever an "eyesore" to those who love to see things "done decently and in order."

BUFFALO.

ANSWERS TO CORRESPONDENTS.

"DID not meet. Send by Bogley's express ten dollars ($10) to Great Falls House."

The above message contains fourteen words, Great Falls House being counted as three words.

Per cent are two words, and are counted two words.

C. A. O. is informed that Rule 17 prohibiting the receiving for transmission over the wires of this Company, messages containing profane and obscene language, should be strictly observed. No person in the employ of the company should ever receive messages of this description under any circumstances.

THE present address of Mr. Robert J. Fowler is desired. Will some one knowing of his whereabouts reply through the columns of the journal.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
June 15, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since June 1, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

289 Atkinson, Ind.
181 Ava, O.
47 Barnegat, N. J.
120 Crittenden, N. Y.
74 Cato, N. Y.
47 Coalport, N. J., re-opened, check Trenton, N. J.
Creswell, Or., tariff same as Albany, Or.
151 Dixmont, Pa.
30 East Berkshire, Vt.
38 Enosburg Falls, Vt.
* Eckhart, Md.
289 Earl Park, Ind.
92 Fair Haven, N. Y.
242 Florence, O.
289 Fowler, Ind.
457 Godfrey, Ks.
120 Grimesville, N. Y.
60 Greensboro, Md.
Gallatin, Cal., tariff same as Los Angeles, Cal.
66 Grand Tunnel Colliery, Pa., check Wilkesbarre, Pa.
319 Grayville, Ill.
Haywards, Cal., re-opened, tariff same as San Francisco, Cal.
38 Highgate Springs, Vt.
370 Ironton, Mo., re-opened.
237 Jonesboro, Ga.
139 Laona, N. Y.
308 Loda, Ill., re-opened.
358 Literberry, Ill.
384 McComb City, Miss.
300 Mount Carmel, Ill.
67 Marydell, Md.
* Margaretville, N. Y.
289 Montmorency, Ind.
41 Oyster Bay, L. I., N. Y.
* Ocean Mines, Md.
211 Oak Harbor, O.
289 Otterbien, Ind.
170 Port Washington, O.
94 Richmond Furnace, Pa.
30 Richford, Vt., heretofore an Other Line Office.
38 Sheldon, Vt., heretofore an Other Line Office.
300 St. Francisville, Ind.
289 Templeton, Ind.
486 Willis, Texas.

SUMMER OFFICES RE-OPENED.

57 Trenton Falls, N. Y.
54 Kingston, Md.
60 Laurel, Del.
143 Allegheny Springs, Va.
103 Berkeley Springs, W. Va.
93 Wyoming, Del.
54 Westover, Md.
143 Montgomery White Sulphur Springs, Va.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.		Leases this Line.
Eckhart, Md.	20	1	Cumberland, Md.
Margaretville, N. Y.	40	3	Roseout, N. Y.
Ocean Mines, Md.	20	1	Cumberland, Md.

OFFICES CLOSED.

Armstrong Run, Pa., East Foxburgh, Pa., Madison, Ark., New Hope, O., Newton, Miss., Pilot Knob., Mo., Woodlawn, Ill., and West Danby, N. Y.

GENERAL INFORMATION.

The name of the office heretofore known as Townsend, O., has been changed to Collins, O.; that of Jonesboro, Ill., changed to Anna, Ill.; and that of Michigan Southern Crossing, Ill., changed to Grand Crossing, Ill.

Hereafter the "Tariff for Other Lines" to Frostburg, Mount Savage and Lonaconing, Md., will be 20 and 1 from Cumberland, Md.

The P. O. address of Weehawken, N. J., is "Weehawken, Hoboken, N. J., P. O."

Business for East St. Louis, Ill., will hereafter be checked to St. Louis, Mo.

In JOURNAL May 1, 357 Oscow, Ill., should read, 357 Osco, Ill.

The office at Seaville, N. J., will hereafter be checked direct.

CUBA CABLE BUSINESS.

We are notified of following rates to offices on West India and Panama Co.'s lines, to take effect June 1, 1872.

To	From U. States East of Miss., including St. Louis.		From U. States West of Miss., excluding St. Louis.		From New Brunswick and Nova Scotia.	
	1st ten words.	Each Add'l word.	Ten words.	Each Add'l word.	Ten words.	Each Add'l word.
	GOLD.		GOLD.		GOLD.	
Santiago.....	$6 25	$ 53	$9 00	$ 90	$7 25	$ 63
Kingston.....	7 75	68	10 50	1 05	8 75	78
Porto Rico....	11 50	1 06	14 25	1 43	12 50	1 16
St. Thomas...	11 88	1 09	14 63	1 46	12 88	1 19
St. Kitts.....	12 75	1 18	15 50	1 55	13 75	1 26
Antigua.....	13 00	1 21	15 75	1 58	14 00	1 31
Guadaloupe...	13 38	1 24	16 13	1 61	14 38	1 34
Dominica.....	13 75	1 28	16 50	1 65	14 75	1 38
Martinique....	14 00	1 31	16 75	1 68	15 00	1 41
St. Lucia.....	14 25	1 33	17 00	1 70	15 25	1 43
St. Vincent...	14 50	1 36	17 25	1 73	15 50	1 46
Grenada.....	15 00	1 41	17 75	1 78	16 00	1 51
Barbadoes.....	15 13	1 42	17 88	1 79	16 13	1 52
Trinidad.....	15 50	1 46	18 25	1 83	16 50	1 56
Demerara.....	17 50	1 66	20 25	2 03	18 50	1 76
Berbice.....	17 50	1 66	20 25	2 03	18 50	1 76

ATLANTIC CABLE BUSINESS.

We are notified that the "Ordinary Continental Rate" to the following countries is reduced from $1.50 to $1.00 for twenty words and under; half the latter rate for each ten or fraction of ten additional words.

Baden, Bavaria, North Germany, Wurtemburg and Hohenzollern. To take effect at once.

The following question in relation to tariffs, with its answer, should be noted by managers:

"From time to time, tariff rates to certain points have been given as follows: To A. so much more than to B. Does any subsequent change in rate to B. alter rate to A.?"

ANSWER.

No. The tariff to A. remains the same.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, June 10, 1872.

On and after June 20, Springfield Mass., and Memphis, Tenn will be added to the list of "Offices Specially Authorized."

I. C. HENDRICKSON, Transfer Agent.
G. H. MUMFORD, Vice-President

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THE SERVICE.

WESTERN UNION TELEGRAPH CO.

MARCH, 1872.

Appointments.

F. W. Baldwin.....Operator.....New York
F. C. Douglass..... " ..... "
D. S. Lyon..... " ..... "
J. F. Riley..... " ..... "
J. F. Taylor..... " ..... "
F. A. Wells..... " ..... "
Mary L. Rockfellow.. " ..... "
Maggie McConnell.... " ..... "
Iva Holmes..... " ..... "
Nellie Lowell..... " ..... "
R. N. Stevens..... " ..... "
M. C. Salisbury..... " ..... "
E. Burnes..... " ..... "
S. Weep..... " ..... "
C. A. Williams..... " ..... "
L. E. Weller..... " ..... "
H. W. Chambre..... " .....Quarantine, S. I.
Annie M. Dodge..... " .....Herkimer, N. H.
N. A. Daniels.....Manager.....Summerville, Mass.
W. F. Stevens..... " .....No. Leominster, Mass.
C. Nellie Morrison... " .....Canastota, N. Y.
— Comstock..... " .....Maple Hill, N. Y.
H. J. McCormick.....Operator.....Oswego, N. Y.
Miss Kitty Long..... " .....Syracuse, N. Y.
W. E. Fenno.....Manager.....Suspension Bridge, N. Y.
Herbert J. Bresee....Operator.....Binghamton, N. Y.
J. H. Marcy.....Manager.....Carbondale, Pa.
W. H. Stevenson.....Operator.....Bridgeport, Conn.
M. C. Lincoln.....Manager.....Green, R. I.
H. M. Field..... " .....Great Barrington, Mass.
F. M. Richards..... " .....Medfield, Mass.
N. O. L. Wood..... " .....Milford, "
W. A. McCurda.....Operator.....Fitchburg, "
E. M. French.....Manager.....Neponset, "
Frank Wright.....Operator.....Stamford, Conn.
W. E. Thompson..... " .....Springfield, Mass.
John Donahue..... " ..... " "
A. G. Rider..... " .....Taunton "
A. Woodward..... " .....Worcester, "
F. Murphy..... " .....Brewsters, N. Y.
Martha A. Hargitt.... " .....Carmansville, "
H. Palmer.....Manager.....Anagance, N. B.
C. F. Byrne.....Operator.....Fredericton, "
O. Johnson.....Manager.....Harvey, "
R. W. Holesworth.... " .....Shubenacadiac, N. S.
F. A. McKenzie..... " .....Wolfville, "
H. Williamson..... " .....Elizabeth, N. J.
A. P. Houck..... " .....Goldsboro, York Co., Pa.
W. T. H. Barr.....Operator.....Jersey City.
A. Clark Case.....Manager.....Metucken, N. J.
Howard Rice..... " .....Millerstown, P. Co., Pa.
D. H. Rodney..... " .....Newport, Del.
G. W. Waite.....Operator.....New Brunswick, N. J.
C. R. Richards.....Manager.....Roselle, "
J. H. Swenk..... " .....Sunbury, Pa.
F. H. Duncan..... " .....Trenton, N. J.
E. F. Rink.....Depot Operator..... " "
M. E. Kirschner.....Manager.....Tuscarora, Pa.
A. Barnett..... " ..... New Philadelphia, Pa.
W. C. Canby.....Operator.....Baltimore, Md.
Geo. A. Simpson..... " ..... " "
C. L. McArthur..... " ..... " "
W. K. Morley..... " .....Bloomington, Ill.
C. H. Brown..... " .....Davenport, Ia.
E. L. Smith.....Manager.....Jacksonville, Ill.
L. D. Stanley.....Operator.....Springfield, "
F. P. Curry..... " .....Chicago, "
A. V. Carr.....Manager.....Nebraska City.
L. L. Smith.....Operator.....Titusville, Pa.
Samuel Bell, Jr.....Manager.....West Alexander, "
H. M. Burrill.....Operator.....Pittsburg, "
G. W. Bausmann..... " ..... " "
E. J. Corrigan..... " ..... " "
Charles Mathias..... " ..... " "
J. A. Knox..... " ..... " "
C. E. Rutson..... " .....Green Bush, Mich.
Thomas Thomson.... " .....White Rock, "
William H. Dolan.... " .....Buffalo, N. Y.
S. T. Davidson..... " ..... " "
J. C. Wilson..... " ..... " "
G. E. Hinman..... " .....Cleveland, O.
Ann Edwards..... " .....Detroit, Mich.
J. B. Littlefield..... " ..... " "
Charles E. Watts..... " ..... " "
J. H. Rhodes.....Manager.....Bellfontaine, O.
C. Hovey.....Operator..... " "
Edwin F. Sheets..... " .....Terre Haute, Ind.
J. J. Grant.....Manager.....Huntingdon, W. Va.
J. A. Lockhard..... " .....Liberty, Va.
B. F. Dillon.....Operator.....Lake City, Fla.
A. H. Morris..... " .....Macon, Ga.
J. H. Duncan.....Manager.....Cartersville, "
E. J. Davis..... " .....Greensboro, Ala.
E. B. Havis..... " .....Kingston, Ga.
W. J. Spear..... " .....La Grange, Ga.
C. S. Johnson.....Operator.....Montgomery, Ala.
P. E. Murray..... " .....Rome, Ga.
Robert Whiting..... " .....Petersburg, Va.
L. F. Lindsey.....Manager.....Jackson, Tenn.
E. L. Curtis..... " .....Crystal Springs, Miss.
A. Cole..... " .....Wesson, "
H. A. Berry..... " .....Hopkinsville, Ky.
E. V. Weiler.....Operator.....New Orleans, La.
A. L. Richardson..... " .....Augusta, Ark.
F. A Egan.....Manager.....Lavaca, Texas.
J. C. D. Elmore..... " .....Highland, "
A. E. Fuller.....Operator.....Monroe, La.

Resignations and Dismissals.

D. O'Keeffe.....Operator.....New York
W. F. Stone..... " ..... "
Thomas Weller..... " ..... "
L. Q. Judge..... " ..... "
E. A. Ward..... " ..... "
A. G. Bates..... " ..... "
Mary A. Travis.....Manager.....Canastota, N. Y.
H. H. McKee..... " .....Maple Hill, "
A. B. Smith.....Operator.....Utica, "
William Blackham.... " .....Binghamton, "
D. C. Freeman.....Manager.....Great Barrington, Mass.
Geo. G. Pond..... " .....Milford, "
A. C. Southwith..... " .....Neponset, "
John Dougherty.....Operator.....Worcester, "
G. H. Trueman.....Manager.....Apohaqui, N. B.
— Freeze..... " .....Harvey, "
L. W. Hoyt..... " .....Wolfville, N. S.
Charles H. Walton.... " .....Elizabeth, N. J.
W. Fenstacher..... " .....Millerstown, P. Co., Pa.
T. A. Murdoch..... " .....Sunbury, "
John Monroe.....Operator.....Trenton, N. J.
Samuel Bracken..... " .....Philadelphia, Pa.
William Hargrave.... " ..... " "
C. L. Laverty..... " .....Washington, D. C.
Minor Lemon..... " ..... " "
E. N. Thompson..... " ..... " "
T. Murray..... " .....Bloomington, Ill.
A. S. Strong..... " .....Galesburg, "
S. M. Allen.....Manager.....Jacksonville, "
A. F. Parker.....Operator.....Springfield, "
H. C. Marks..... " .....Chicago, "
J. F. Farrell..... " ..... " "
Mary A. Clark..... " ..... " "
Samuel Johnson..... " .....Kansas City.
C. F. Williams.....Manager.....Nebraska City.
P. D. Howard..... " .....Fort Benton, M. T.
P. J. McHugh..... " .....Omaha, Neb.
D. Carpenter.....Operator.....Oil City, Pa.
J. A. McKenna..... " .....Pittsburg, "
S. L. Fullwood..... " ..... " "
John B. Slocum..... " .....Buffalo, N. Y.
W. E. Smith..... " ..... " "
L. L. Tootill..... " .....Detroit, Mich.
C. A. Hawkins.....Manager.....Bellfontaine, O.
John Kniffin.....Operator..... " "
R. C. Duncan..... " .....Indianapolis, Ind.
Geo. H. Lee..... " .....Terre Haute, "
R. H. Bell.....Manager.....Huntingdon, W. Va.
J. B. Clarke.....Operator.....Macon, Ga.
W. J. Young.....Manager.....Greensboro, Ala.
John Campbell..... " .....Cartersville, Ga.
J. W. Ha..... " .....La Grange, Ga.
A. F. Brannon..... " .....Montevalle, Ala.
C. R. Vestal.....Operator.....Rome, Ga.
R. L. Millan.....Manager.....Petersburg, Va.
P. Fowler..... " .....Paducah, Ky.
John Thomson..... " .....Crystal Springs, Miss.
B. W. Herring..... " .....Wesson, Miss.
Virgil Walker..... " .....Hopkinsville, Ky.
Enoch J. Wauh.....Operator.....Augusta, Ark.
J. C. Chilton.....Manager.....Lavaca, Texas.
E. L. Haviland..... " .....Highland, "
Whit Hancock.....Operator.....Austin, "
F. M. Shefers..... " .....Monroe, Ala.

Transfers.

OPERATORS.

	From	*To*
Herbert Y. Bresee....	Suspension Bridge....	Binghamton, N. Y.
C. E. Ward....	....Wedfield.....	Foxboro, Mass.
A. L. Page.....	New Rochelle.....	New Haven, Conn.
C. W. Waterbury.....	Stamford.....	New Rochelle, N. Y.
J. C. Robinson.....	Springfield.....	Boston, Mass.
J. Gay.....	Brewsters, N. Y.....	Dover Plains.
Miss M. A. Dickinson..	Carmansville..	New York City.

MANAGERS.

F. E. Smith,.....	Anagance.....	Apohaqui, N. B.
W. E. Yackley.....	Jersey City.....	New York City.

OPERATORS.

S. S. Cox.....	New Brunswick.....	New York City.
Geo. Makle.....	Baltimore, Md.....	Wheeling, W. Va.
E. A. Leslie.....	New York City.....	New Orleans, La.
C. H. H. Cottrell.....	New Orleans.....	Washington.
W. J. Landy.....	New York.....	New Orleans, La.
D. J. Logan.....	Monroe, La.....	Cedar Rapids, Ia.
Charles H. Boynton..	Leavenworth.....	Kansas City.
J. H. Zeigler.....	Catlettsburg.....	Ashland, Ky.
P. E. Murray.....	Kingston.....	Rome, Ga.
J. H. Crowder.....	Notasulga.....	Loatchapoka, Ala.
J. W. Harris.....	Loatchapoka.....	Montevalle, Ala.
J. F. Cobourn.....	Jackson, Tenn.....	Paducah, Ky.
F. G. Gwynne.....	Montgomery, Al.....	Austin, Tex.

TELEGRAPHERS' INSURANCE ASSOCIATION.

The acknowledgment of receipt on any one assessment is to be understood as an acknowledgment for all previous assessments.

Assessment No. 27.

597 1207

No. 28.

51 71 82 230 289 297 357 376 434 667 842 1053 1125

No. 29.

13 22 70 95 330 456 714 726 1024 1053 1191 1195 1207 1243 1257 1291 1386 1395

No. 30.

5 6 8 13 15 19 25 26 27 29 39 49 51 64 67 72 74 75 80 83 89 93 95 97 98 106 107 108 111 114 120 121 127 136 139 141 142 143 144 146 148 150 154 156 158 160 162 164 166 171 172 175 176 177 178 179 185 186 187 188 189 190 191 193 197 198 200 201 202 206 213 220 225 232 233 237 238 239 240 243 246 247 248 253 254 255 256 258 267 271 277 280 286 294 297 298 303 312 323 327 328 347 359 360 361 362 364 366 367 371 372 376 382 388 389 392 393 394 398 402 416 418 425 430 431 433 451 453 455 457 466 468 469 470 474 475 481 482 508 514 515 524 526 527 532 554 555 556 557 565 570 573 575 579 581 584 586 592 594 597 603 604 616 617 618 622 628 630 643 646 648 649 655 684 690 694 695 697 698 705 708 710 714 717 720 723 724 725 728 730 732 733 735 737 738 741 743 744 750 751 756 766 773 774 778 781 782 783 785 786 790 800 801 802 808 817 823 825 831 832 836 838 841 842 848 850 859 868 869 871 873 876 880 886 896 897 899 908 911 912 916 917 920 922 927 930 939 940 941 944 946 949 952 954 955 956 957 958 959 960 963 964 966 976 991 992 996 998 1005 1006 1014 1016 1019 1020 1025 1028 1030 1031 1032 1033 1034 1041 1042 1044 1050 1053 1056 1059 1061 1062 1063 1071 1072 1077 1079 1080 1081 1084 1085 1091 1092 1093 1099 1102 1103 1134 1135 1136 1137 1141 1148 1151 1152 1153 1154 1155 1156 1157 1158 1159 1160 1162 1166 1181 1185 1190 1192 1193 1194 1195 1196 1201 1205 1208 1209 1215 1217 1218 1221 1223 1226 1227 1231 1233 1234 1235 1241 1242 1248 1251 1252 1255 1256 1262 1263 1265 1266 1267 1268 1268½ 1269 1270 1273 1274 1275 1284 1285 1286 1287 1288 1294 1295 1296 1307 1308 1309 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320 1321 1322 1323 1326 1328 1332 1333 1335 1336 1353 1354 1355 1356 1357 1364 1365 1372 1378 1379 1380 1381 1385 1386 1388 1389 1390 1391 1393 1399 1400 1405 1406 1407 1408 1411 1415 1416 1417 1418 1421 1422 1423 1425 1426 1428 1430 1431 1432 1433 1434 1436 1437 1438 1443 1444 1446 1448 1449 1450 1457 1458 1460 1461 1462 1464 1465 1466 1467 1468 1469 1470 1471 1472 1473 1474 1475 1476 1478 1480 1489 1499 1500 1501 1502 1505 1508 1509 1510 1511 1512 1524 1545 1558

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 15. NEW YORK, JULY 1, 1872. WHOLE NO. 112.

PROPAGATION OF ELECTRICITY.

Prior to 1827, the ideas which were entertained regarding the propagation of electricity, were exceedingly vague and indefinite. In consequence of its enormous velocity of transmission, it was imagined to be analagous to light, and in the phenomena relating to the latter, indications were sought for eliminating the laws governing the former. It was not until 1827 that the truth began to appear, and to be exhibited under its true aspect. At this epoch, Ohm, a German mathematician, struck with the idea that the propagation of electricity might well be similar to that of heat, applied to it the formulas which Fourrier and Poisson had deduced respecting the latter, and promulgated in a clear and precise manner the beautiful laws governing the transmission of electric currents, which bear his name, and which experience has again and again confirmed. But to establish wholly a basis of calculations upon a parallel hypothesis, at a time when the thoughts of scientists were all turned in another direction, required to be more of a philosopher than a scientist, and that is precisely why Ohm, being a mathematician, was able to establish, without preconception and without prevention, his admirable theory. Nevertheless, his labors did not receive in the scientific world the success which should have attended them, but on the contrary, subjected him to a persecution which pursued him even in his position as professor. It was not until ten years later, and after M. Pouillet had arrived at the same laws by experiment, that the scientists began to revise the judgment which they had formed against Ohm, and to appreciate the merits of his discovery. In the meantime, although adopting the formulas of the illustrious mathematician, the scientists have refused, until within the past ten years, to admit his theory of the assimilation of the propagation of electricity to that of heat, and it is probably owing to this action on their part, that they have arrived at such discordant results regarding the velocity of the electric current.

Towards the end of the year 1859, M. Gaugain, an able electrician, who had for some time occupied himself in verifying the laws of Ohm in regard to the transmission of electricity over bad conductors, sought to solve the causes of this disaccord, and at last found the key to the enigma. He became convinced that electricity, instead of being propogated as a wave, or in a manner analagous to that of sound or light, was, on the contrary, transmitted, as stated by Ohm, in the manner of heat in a metallic bar, which is hot at one end and cold at the other. In this case the heat and the cold communicate from place to place gradually, from the two extremities of the bar, and in proportion as this double movement of heat and cold is propagated towards the middle of the bar, the parts first heated and cooled acquire and lose a quantity of heat until the two calorific movements having met each other, the different points of the bar lose on one side as much heat as they gain on the other. Then the calorific equilibrium is established, and the distribution of heat upon all parts of the bar remains the same. This is what is called the permanent calorific state. But before a metallic bar arrives at this state, it requires more or less time, according to its calorific conductivity, and this time, during which every point of the heated body unceasingly changes in temperature, constitutes a variable period, which, if the assimilation of the propagation of heat with that of electricity is true, ought to exist in the first moments of the transmission of a current; for, in this hypothesis, an electric current is only the result of the equilibrium which tends to establish itself from one extremity of the circuit to the other, between two different electric states constituted by the action of the battery, and representing, consequently, the two different temperatures of the heated bar. Without doubt, this period, variable by reason of the subtility of the electric fluid, must be exceedingly short; but for very long circuits, and for transmission over poor conductors, it would be appreciable, and that is what the experiments of M. Gaugain fully demonstrated. Since then he has investigated the laws of the transmission of the current during this variable period, and he has established, among other laws, that the necessary time for a current to obtain the permanent state in a circuit, that is to say all the strength which it is susceptible of acquiring, is proportional to the square of the length of the circuit. This result was not only forseen by Ohm, but still more, mathematically formulated by him in the equation representing the tension of the different points of the circuit in the variable period of the strength of the current. Thus Ohm, who was not a scientist, discovered by force of reasoning a phenomena, which the electricians only discovered thirty-four years later.

We shall presently show the laws of the current in the two periods of electric propagation, but it is essential that we first examine the distribution of the electricity in the circuit.

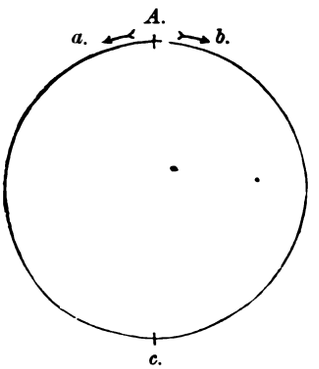


Fig. 1.

Let the ring, (figure 1), represent a homogeneous conductor, and an electric machine be supposed to exist at A. The electricity from the machine will diffuse itself over both sides of the ring; the positive passing toward *a*, and the negative towards *b*, both fluids uniting at *c*. Now, if the electricity be so distributed over the ring that a heaping up of the fluid nowhere occurs, it follows that equal quantities of electricity will pass through all cross sections of the ring in the same space of time. If it be assumed that the passage of the fluid from one cross section to another is solely due to the difference of the electric tension at both these points; and further, that the quantity which passes is proportional to this difference of tension, it follows that the positive fluid proceeding from A right to *c*, and the negative fluid proceeding from A left to *c*, must decrease in tension the further they recede from A. The tension of the electricity at every point in the circuit may be represented by a diagram. Let the ring be suppposed

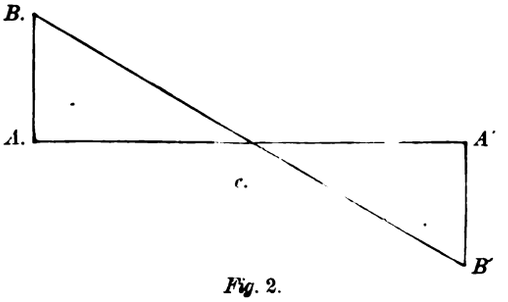


Fig. 2.

stretched out into a straight line, AA (figure 2); let the ordinate AB represent the tension of the positive electricity, and A´B´ the tension of the negative electricity at the point of excitation, then the ring being homogeneous and of the same diameter throughout, the straight line BB´ will express the tension for all points of the circuit.

From these considerations, the law of Ohm expressed by the celebrated formula $S=\frac{E}{R}$ where S represents the strength of the current, E the electro motive force of the battery, and R the resistance, naturally follow. If the electromotive force AB+A´B´ remain constant, then the greater the length of AA´ the less steep will be the inclination of the line BB´; that is to say, the less will be the difference o tension in two contiguous cross sections. But by the hypothesis, this difference is proportional to the quantity of fluid which passes from one cross section to another; and hence it follows that the greater the length of the circuit, the less will be the amount of electricity which passes through any cross section in a given space of time.

If the conductor AA´ be composed of material which offers a greater resistance to the passage of the electricity than that above supposed, as long as its length remains unaltered, the distribution of the electricity will be the same. But inasmuch as the moving force—that is, the difference of tension between two neighboring cross sections—is also the same as before, a less quantity of electricity must pass from section to section in a given time than in the case of a good conductor; or, in other words the current must be weaker. A greater le-

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the better conductor would produce precisely the same effect. These results find definite expression in the law, that *the strength of the current is inversely proportional to the resistance of the circuit.* Preserving the length and material of AA′′ unchanged, and regarding the force AA′+BB′ as variable, we deduce the law that *the strength of the current is directly proportional to the electromotive force.*

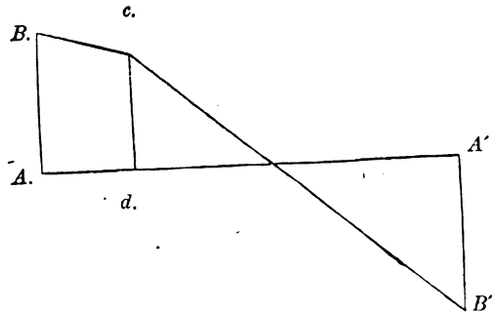


Fig. 3.

Let the conductor AA′ (fig. 3) consist of the same material throughout, but of two portions possessing different cross sections. Let the cross section of Ad, for example, be *m* times that of dA′; then, if equal quantities pass through all sections in equal times, if through a unit of length of wire of *m* times the cross section, no more fluid passes than through the thinner wire, the difference of tension at both ends of this unit of length in the former must be only $\frac{1}{m}$th of what it is in the latter. Thus the electric fall, as Ohm terms it—that is, the decrease in the length of the ordinate for the unit of length of the abscissa, will be less in the case of the thick wire than of the thin, as shown by the line Bc in the figure. The distribution of the electricity in such a circuit will be no longer represented by a continuous gradient, but can nevertheless be easily ascertained by calculation when the electromotive force of the circuit and the cross sections of its different portions are known. If, instead of one wire being thinner than the other, its specific resistance were greater, it would follow from the hypothesis of Ohm, that the greater the resistance of the metal, the greater would be the electric fall. The result is summed up in the law, that *the electric fall is directly proportional to the specific resistances of the metals, and inversely as their cross sections.*

To ascertain by experiment whether the actual distribution of electricity throughout a galvanic circuit bore any resemblance to that theorized by Ohm, M. Kohlrausch used an electrometer of surpassing delicacy, consisting of a thin needle of silver wire, two inches in length, suspended horizontally from a glass fibre of exceeding fineness. The fibre, which passed in the usual manner through a glass tube, was fastened to a torsion head, the index of which being turned, caused the little needle of silver wire at the other end to follow it. The needle lay across a thin slip of silver of its own length, through a slit in the centre of which it could descend. At the slit the strip was bent right and left, so that the needle, in following the index, could lay its entire length against the strip. When the needle crossed the strip at right angles, the latter was raised so that the needle rested upon it, the apparatus thus forming a continuous cross of conducting material. Electricity being communicated to the strip, distributed itself over the entire cross. When this was affected, the strip was lowered so that the needle again hung free. The index above being turned, the needle was compelled by the torsion of the fibre to approach the strip, but being charged with a like electricity, was repelled. By this play of torsion on the one hand, and repulsion on the other, a knowledge is obtained of the tension of the electricity communicated.

In connection with the electrometer, a condenser was made use of, the accuracy of which was carefully tested beforehand. For experiments with the galvanic circuit, both plates were of brass, suspended in a suitable frame by strings of silk, and separated from each other by shell-lac placed at three different points near the periphery. When the poles of the battery were connected with these plates, the one became charged with positive, the other with negative electricity, and the strength of the charge was estimated by removing one of the plates to a certain fixed distance, and bringing the other, by means of an isolated copper wire, into connection with the electrometer. The question suggested itself to Kohlrausch, whether any relation existed between the electromotive force of a voltaic element (which Ohm expresses in his formula by the letter E) and the tension of the electricity of the two poles of the element. The electromotive forces of various combinations were determined by Wheatestone's method. To ascertain the tension of the poles, the circuit, which had remained in action for some time, was suddenly broken, and the ends of the wire were brought into connection with the plates of the condenser. The plates were then separated, and one of them immediately brought into connection with the electrometer, and the strength of the charge measured. The results derived from this process established the important fact, *that the electromotive force is proportional to the electric tension at the ends of the newly-broken circuit.*

EFFECTS OF ELECTRICITY ON MILK.

The *Milk Journal* states that, in an address before the North Western Dairyman's Association, Mr. X. A. Williard repeats the following interesting facts:

Mr. Andrew Cross, the celebrated English Experimenter, considered that the roots and leaves of plants were in opposite states of electricity; some of his experiments in this direction are very interesting. He cut two branches from a rose tree. They were as nearly alike as possible, with the same number of buds, and both equally blown. An arrangement was made by which a negative current of electricity was passed through one, a positive current through the other. In a few hours the negative rose drooped and died, but the positive continued its freshness for nearly a fortnight; the rose itself became full blown and the buds expanded, and survived an unusual length of time. Again, he was able to keep milk sweet for three weeks in the hottest weather of summer, by the application of a current of positive electricity.

On one occasion, he kept fishes under the electric action for three months, and at the end of that time they were sent to a friend, whose domestic knew nothing of the experiment. Before the cook dressed them, her master asked her whether she thought they were fresh, as he had some doubts. She replied, that she was sure they were fresh, indeed, she said, she would swear they were alive yesterday. When served at table, they appeared like ordinary fish, but when the family attempted to eat them, they were found to be perfectly tasteless; the electrical action had taken away all the essential oil, leaving the fish unfit for food. However, the process is exceedingly useful for keeping fish, meats, etc., fresh and good for ten days or a fortnight. Now this is consistent with our observation and the facts known to every one in the habit of handling milk. When the condition of the atmosphere is in a negative electrical state, or shows a deficiency of positive electricity, a state of whether which we designate as sultry, close, muggy, and the like, there is always difficulty in keeping milk sound. Even in good, healthy milk, the fungus germs common to all milk increase and multiply with great rapidity, producing the common lactic acid fermentation or souring of the fluid; but in case fungi from decomposing animal or vegetable matter comes in contact with the milk, rapid decomposition takes place, and we have rotten milk, putrid odors, and floating curds. The exposing of such curds to the atmosphere, as well as the aeration of milk to improve its condition, are both philosophical, because these minute organisms of fungi are affected by the oxygen of the air, which checks their development and multiplication.

The influence of electrical action is a question entirely new to the dairy public, but it is one concerning which I think some useful suggestions present themselves for our consideration. When the electrical equilibrium is disturbed, or when the state of the atmosphere indicates a preponderance of negative electricity, we are all made aware of the fact by its depressing influences. At such times it is important that we take more than ordinary care in the handling of milk; that it be kept out of harmful odors; that attention be given to its aeration, and such treatment be given it as shall be inimical to the growth and development of fungi. And again, the fact that milk may be kept sweet a long time in hot weather by electrical action will offer a very important suggestion to inventors in the preservation of milk, and perhaps in the improvement of cheese at the factories. I believe that we are only on the threshold of the cheese making art, and that as we become better acquainted with the laws of Nature and their application, great progress is yet to be made in every branch of dairy husbandry.

CHINESE BY TELEGRAPH.

The managers of a telegraph company in China, have recently solved the problem how to transmit telegraphic messages in Chinese. At first sight the difficulty of an alphabet which is made up of about fifty thousand distinct characters, appears almost insurmontable, but the obstacles have been overcome, and A-Fat, at Hong Kong, encounters no more difficulty in communicating with A-Chum, at Shangai, than does Brown with Jones, under similar circumstances. The plan adopted is this: Some few thousands of the more common Chinese characters are cut on wooden blocks after the manner of type, and on the reverse end of each is a number cut in the same way. Now A-Fat, having handed in his message written in Chinese, the native clerk selects in order the corresponding blocks from the case, and prints off the numbers on their reverse. This he hands to his English colleague, who telegraphs the numbers to the destination desired. Here the reverse process is gone through, and, the numbers having been taken from the cases, the characters are stamped on paper, and thus A-Chum is put in possession of the cherished wishes of A-Fat through the medium of his native language.

PRESENTATION.—A meeting of the Liverpool telegraphists was held on Saturday evening, a few weeks since, for the purpose of presenting a testimonial to Mr. W. H. Evans, for many years connected with the late Magnetic Telegraph Company, and until recently in the service of the postal authorities on the electricians' staff, he being about to leave England for Canada. The presentation took the form of a highly illuminated address, a beautiful gold locket (subscribed for by the ladies connected with the department), scarf-pin, designed by Mr. Jacobs, Church-street; and a copy of Shakspeare's works handsomely bound.

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WESTERN UNION TELEGRAPH OFFICE, AT ERIE, PA. THE NEW LOCATION IN THE ROSENZWEIG BLOCK.

Among the many improvements made this spring, denoting business prosperity, is that of the Western Union Telegraph Company, which has removed from its inconvenient second story rooms, to the ground floor, State street front, of the Rosenzweig Block, which has been fitted up in a style somewhat in consonance with the large business done. The room is 20x42 feet. The counter that bounds the reception room is an L shape, fifteen feet each way, and is of chestnut, ornamented with strips of walnut. Above the counter there is a railing of handsome scroll work, and this is covered with wire gauze. In the receiving room is a chestnut table, supported by brackets, that is one of the nicest plain pieces of joiner work to be found anywhere. The operating room is supplied with three walnut operating tables, six feet long and thirty inches wide, with scroll work back.

Last, but not least to the telegraphic eye, there is a new switch board, with upwards of four hundred bright brass cranks on its surface, the use of which is a mystery to the uninitiated, but which control, to the use of the various machines, the news from the ten wires leading into the establishment. The "local batteries," of which they now have six in position, are the Callaud (French) patent, emit no smell, and do not need renewing oftener than once in six months.

WESTERN UNION TELEGRAPH OFFICE AT MEMPHIS, TENN.—THE NEW LOCATION ON MADISON STREET.

The new office of the Western Union Telegraph Company, at No. 33 Madison street, between Main and Second, has been opened for business. The business apartments occupy the first floor, where Mr. Glynn Baker, the Manager, has his quarters; the second floor by Colonel James Coleman, the Superintendent, and the third by the operators.

In 1847, Colonel Coleman built the first telegraph line that connected Memphis with the world. It extended from Nashville via Columbia, Waynesboro, Purdy, Somerville and Raleigh to Memphis. Now there are twenty-two lines, covering every point of the compass.

Quite a number of gentlemen of the press and other citizens were invited to inspect the new quarters, which they did, and were highly pleased with the completeness and adaptation of the office for the business. After they were through, an adjournment was had to the "National," next door, where an enormous bowl of champagne punch, provided by Colonel Coleman, was discussed.

Glynn M. Baker, Manager; P. J. Murray, Receiving Clerk; Chas. Gaston, Delivery Clerk; Joe Whitney, Book-keeper; Chas. Marable, Assistant Book-keeper; Lindsey Mynatt, Assistant; Dick O. Dyer, Chief Operator; Joe Fowler, Assistant Chief Operator; Chris. Reilly, Marco F. Paoli, Alf. Saville, Cornelius McCarthy, S. M. Dunlap, C. Paxson, Day Operators; Howell Sigler, Charles H. Patch, M. G. Chettle, P. J. Fowler, Charles Curry, Night Operators; Willie Kirk, Operator, Commercial News Department; Henry Joyce, Assistant in the office; William Brown, Check Boy, and six Messengers; Dan Shay, Foreman of Repairs; Charles Clements, Battery Man.

The operators are all of the first-class, and most competent and accomplished gentlemen. None are employed except men of the first order and highly qualified.

There are nine single tables for one wire each, and two double tables, each holding two sets of Phelps' self-breaking repeaters.

SUN STROKE.

Sun stroke and stroke of lightning, says Dr. Hall, as far as present light extends, cause death in the same manner; the blood is expanded and gases are liberated, both tending to distend the veins, which causes in the brain a species of apoplexy; this distension of blood vessels induces pressure on the brain, and consequently all loss of sense and feeling; the muscles are paralyzed, all motion ceases, and the functions of the body are all arrested.

Apply cold cloths or ice bags to the head, and mustard plaster to the neck, with something to act on the bowels as soon as possible. But something more speedy than this is an imperative necessity in most cases, or death will ensue in a few moments. Skillful and eminent physicians in this country, upon actual experiment, founded upon a true philosophy, have ascertained that speedy recovery takes place, within an hour, if the patient is bled from both arms in the old-fashioned way. From the largest distended vein the blood may only flow by drops at the first second or two, but as it flows freer, the relief becomes almost miraculous, and speedy and complete.

WHAT TO DO IF THE CLOTHES TAKE FIRE.

So many accidents are daily occurring from broken kerosene lamps, and clothes taking fire from gas lights and open fire-places, that the following, which we clip from an exchange, deserves attention: Perhaps three persons out of four would rush right up to the burning individual, and begin to paw with their hands without any aim. It is useless to tell the victim to do this or that, or call for water. In fact, it is generally best not to say a word, but seize a blanket from a bed, or a cloak, or any woolen fabric—if none is at hand, take any woolen material—hold the corners as far apart as you can, stretch them higher than your head, and running boldly to the person, make a motion of clasping in the arms, just about the shoulders. This instantly smothers the fire and saves the face. The next instant throw the unfortunate person on the floor. This is an additional safety to the face and breath, and any remnant of flame can be put out more leisurely. The next moment immerse the burned part in sweet oil. Next get some common flour, and put it on the burn, about an inch in thickness, and if possible put the patient to bed. Let the flour remain until it falls off itself, when a beautiful new skin will be found. Unless the burns are deep, no other application is needed. Dry flour for burns is the most admirable remedy ever proposed, and the information ought to be imparted to all. Dredge on the flour till no more will stick, and cover with cotton batting.

PAPER CLOTHING.—An English inventor is said to have produced a really serviceable paper fabric. It is a mixture of various animal and vegetable substances, the former being wool, silk and skins; the latter, flax, jute, hemp and cotton. These articles are all reduced to a fine pulp, bleached, and then felted, by means of machinery. The mixture of these several substances produces a fabric claimed to be of wonderful flexibility and strength, so much so that it can be sewed together with a machine as are woven fabrics, and make as strong a seam.

This paper can be made into table cloths, napkins, handkerchiefs, pants, curtains, shirts, and other articles of dress. The petticoats made from it are said to be of elaborate design and wonderful beauty. The United States *Economist* says they are either printed or stamped, and bear so close a resemblance to linen or cotton goods of like description, as almost to defy the scrutiny of the ablest experts. The stamped open-work skirts display a delicacy of pattern that it would be almost impossible to imitate by any ordinary skill with the needle. Imitation blankets, and chintz for beds, furniture, or curtains, are also made very cheaply. Embossed table cloths and figured napkins made of felted paper, so closely resemble the genuine damask linen, as to be palmed off upon the unsuspecting as the genuine article.

In Germany, paper napkins have been used for several years. Their cost is but a trifle, and they pay for themselves before they require to be cast aside. Felted paper is capable of being made into lace, fringe and trimming; and for these several purposes it is unequaled in point of cheapness and durability. Imitation leather is also made from the same material, which is also impervious to water. It is soft and pliable, and is a useful fabric for covering furniture, making into shoes, for belts, and many other purposes. In China and Japan, paper clothing has long been worn by the inhabitants. It is very cheaply produced there, a good paper coat costing only ten cents, while the expense of an entire suit is limited to twenty-five cents.

ANCIENT MODES OF WRITING.—Some of the earliest methods of writing are singular evidences of the progress of civilization. Bricks, tiles, star-shells, ivory, bark, and leaves of trees were used to write on; and from the latter, leaves of books are probably derived. Copper and brass plates were early in use, and a bill of feoffment on copper was some years since discovered in India, bearing date one hundred years B. C. Leather was also used, as well as wooden tablets. Then the papyrus came in vogue, and about the eighth century the papyrus was superceded by parchment. Paper, however, is of great antiquity, especially among the Chinese; but the first paper mill in England was built in 1586, by a German, in Kent. Nevertheless, it was nearly a century and a half, namely, in 1713, before Thomas Watkins, a stationer, brought paper making to anything like perfection. The first approach to a pen was a stylus, a kind of iron bodkin; but the Romans forbade its use, on account of its frequent and even fatal use in quarrels, and then it was made of bone. Subsequently reeds, pointed and split, like pens in the present day, were used.

HERE are some railroad statistics that will be somewhat surprising to the people who are perpetually declaiming about the criminal carelessness of our railroad managers, and wondering why our roads cannot be run with as great care and safety as those of Europe. The statistics of persons killed or injured on railroads, when tabulated, present the following startling result:

British railroads, one in	430,000
Massachusetts railroads, one in	1,475,000
Belgian railroads, one in	1,600,000
Prussian railroads, one in	3,000,000
French railroads, one in	4,000,000

Men are deceived in this matter by the immense disproportion between American and European travel. Our roads are crowded with business. On the great trunk lines out of New York trains follow each other almost within sight. And the newspapers gather up in one issue accidents spread over an entire continent. In Europe travel is less, the roads are less crowded, there are fewer of them, and the newspapers know less of the accidents which take place upon them. Probably Massachusetts railroads are exceptionally safe; but the dangers of railroad traveling are greatly overrated. Some statistician has estimated that a man must travel several millions of miles before it becomes his turn to be killed or injured.

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STATISTICS OF THE OPERATION OF GOVERNMENT TELEGRAPHS FOR 1870.

	Miles of Line.	Miles of Wire.	Number of Government Offices.	Number of Offices of Private Companies.	Total Number of Messages Sent.	Total Receipts for Messages.	Ordinary Working Expenses.	Extraordinary Expenses.	Total Expenditures.
North Germany	15,049	50,291	1,078	1,327	5,272,321	$1,621,501	$1,721,855	$36,215	$1,758,070
Bavaria	4,040	12,832	317	326	492,188	162,248	125,450	159,385	284,835
Belgium	2,696	8,788	217	228	1,592,079	310,938	287,700	18,030	305,730
Denmark	1,217	3,181	75	75	313,245	104,280	95,156	18,384	113,540
Spain:	7,204	16,489	170	29	744,070	289,340	715,109	....	715,109
Austria	14,021	26,643	536	363	2,264,558	929,221	1,192,104	183,303	1,375,407
Hungary	5,908	17,426	246	241	1,289,155	438,665	467,747	250,074	717,821
Italy	10,514	30,906	600	463	1,813,320	945,234	812,448	142,954	955,402
Norway	3,831	5,606	95	47	364,009	161,565	139,586	87,154	226,740
Holland	1,856	6,297	119	115	1,356,812	256,861	347,677	57,894	405,571
Portugal	1,793	3,347	109	9	165,391	55,368	153,056	....	153,056
Roumania	2,061	2,713	58	...	423,341	213,025	296,829	14,000	310,829
Russia	26,987	53,649	491	213	2,301,679	2,735,200	1,902,102	349,736	2,251,838
Sweden	4,048	10,089	99	187	494,111	224,200	201,540	24,940	226,480
Switzerland	3,203	6,866	483	63	1,329,061	251,432	213,130	27,480	240,610
Turkey	15,827	26,381	348	45	457,993	1,010,184	874,217	100,971	975,188
Great Britain and Ireland	29,746	130,008	2,000	1,780	10,084,020	3,865,127	2,277,195	4,486,166	6,763,362
Indo-European	2,115	3,418	10	...	41,000	281,250	340,000	....	340,000
British India	14,939	24,538	197	537	512,648	599,713	1,224,587	331,312	1,555,899
Totals	167,055	439,468	7,248	6,048	31,311,001	$14,455,352	$13,387,488	$6,287,998	$19,675,487

We give above the results of the operation of the principal government telegraphs in Europe and Asia for 1870. The receipts and expenses in Great Britain and Ireland are for fourteen months. These figures show that the expenses exceeded the receipts by $5,220,135, and that the cost of transmitting the messages averaged 63 cents. These facts are not very favorable for Government Telegraphy in an economical point of view. It will probably be claimed that a portion of the expenses was incurred in the construction of new lines, and should not properly be charged to working expenses. If there is to be a yearly deficit for this account for an indefinite period, however, it would seem to be proper to include it in the expense column, especially as there is no return whatever for the vast amount invested in the construction of the lines. The fact is that Government Telegraphs are an expensive luxury, which only monarchical and personal governments can really afford to indulge in.

NEW THEORY OF ATMOSPHERIC ELECTRICITY.

A correspondent, Mr. G. Wright, of Rock Falls, writes as follows:

"The earth is surrounded by an electrical atmosphere which is subject to the law of gravitation, and is consequently more dense near the surface of the earth, and more rare in the higher regions. All the phenomena of electricity are due to the disturbance of this electrical atmosphere, in connection with the resistance of different substances to the passage of the electric fluid. When any substance has more electricity than another substance near it, it is in a positive or charged condition; when it has less, it is in a negative condition, and the attraction which negative substances exhibit for the positive is only the tendency to restore the equilibrium.

If a bladder be filled with air near the surface of the earth, and then elevated to a considerable distance, the confined air will burst the bladder and escape, because the atmosphere which surrounds it in these higher regions is of less density. So if a metallic ball, having the electrical condition natural to the surface of the earth, be suddenly elevated, its natural electricity becomes a charge, which may be drawn off by a spark. This fact can be demonstrated, on a still day when the air is free from moisture. Now, what better evidence do we want to prove that the earth is surrounded by an electrical atmosphere, more dense near the surface of the earth, and that the charge on the ball which was elevated is due to the lesser density of the electrical atmosphere which there surrounds it? When we add to this the chain of evidence which results from the explanation, of electricity in the clouds, the causes of *aurora polaris*, the daily variation of the magnetic needle, and every other electrical phenomenon, on this hypothesis, the proof is as positive that the earth is surrounded with an electrical atmosphere as that it is surrounded with an aerial one. I have spent several years in experiments and observations to demonstrate the truth of this hypothesis, and upon it to establish a theory that shall be applicable to all electrical experiments and phenomena, and am astonished at the facility with which all questions pertaining to this subject can be solved.—*Scientific American.*

CARBOLIC ACID NOT A PERFECT DISINFECTANT.—A writer in the *English Mechanic* advises its readers not to put implicit faith in carbolic acid as a disinfectant, as he believes its merits to have been greatly overrated. As a deodorizer he considers it far inferior to ordinary chloride of lime, the effect lasting only a short time. He finds that the vapor of chloride is very much superior for the purpose, as it always destroys the vitality of infectious and diseased germs, which carbolic acid does not. To completely disinfect an apartment that has been occupied by a patient suffering under small-pox, typhus fever, or other disease, it is only necessary to vacate the apartment after stopping up the openings, and placing in different parts of the room several plates containing a quantity of common salt on which a little vitriol has been poured. The vapor of chlorine will be instantly nvolved, and will annihilate all infection with which it comes in contact. It may be used even in rooms containing sick persons, if the quantity evolved be so slight as not to inconvenience the lungs of the patient.

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CORRESPONDENCE.

MORE ABOUT TRAIN DISPATCHING.

COLUMBUS, Ohio, June 6th, 1872.

To the Editor of the Journal of the Telegraph:

In the train dispatchers' controversy, which has of late had quite a conspicuous part in your columns, allow me to deposit my mite. Not claiming fifteen years in dispatching trains, yet the short experience I have had in dispatching trains has brought many kinds of systems under close observation. I have found the "double order" system very efficient on roads where schedules were few, where operators were very punctual, and if many sections on the schedules close together. Where many freight trains are running from and against passenger trains, it is necessary, with the "double order" system, to send a copy of each freight train's order to said passenger train; while a "single style" (or "old man's" order system) one order, sent to the agent, operator, or conductor, at the station where said passenger train is to come from, to "hold such passenger train for orders," would be the best way. Thus, according to the "old gentleman's" single system, all the trains on the division could be moved on the one order given to the train when ready to leave, otherwise the passenger train, if many trains were moved against or ahead of them, would have a stack of unnecessary orders, which could be sent as one, saving both time and trouble. As regards positive meeting points, I would add that it depends much on the running rights of trains—whether or not the detention likely to occur from the delayed train would throw the favored train from its next meeting point—otherwise a time order would give one of them a right to proceed. I fail to see where the communication from the L. M. Division "covers the contested ground" which A. T. L. claims by his correspondence of the 7th ult. Train dispatchers should adopt a system best suited for the working of their divisions, where operators are indifferent to their work, have a mania for sleep, and practice it, irrespective of delayed trains. Dispatchers, as a general rule, think themselves fortunate to get a "single" order to them. Brevity should be the aim of every good dispatcher.

CONTROVERSY.

POSTAL TELEGRAPHS.

MONTREAL, 3d June, 1872.

To the Editor of the Journal of the Telegraph:

I have read with much interest the correspondence in the JOURNAL regarding the scheme which is on foot for transferring the telegraphs to the United States Government; and having recently arrived from the old country, where I was in the service of the English Government on the electrician staff, I may perhaps be allowed to say a few words on the subject.

Yielding to the pressure brought to bear by the newspaper press and news room proprietors, who were clamoring for cheap telegraphy, the Government instructed Mr. Scudamore to prepare a scheme whereby the telegraphs of Great Britain and Ireland could be worked by the postal authorities. Ample time was allowed for the preparation of this plan, yet it was apparent, from the great muddle which took place on the day of the transfer, that it was sadly defective, and the folly of entrusting the control of telegraphs to men who were totally ignorant of the working of this most important branch of the public service was at once apparent.

Granted that the rates for sending messages were considerably reduced; but at what cost to the public was this so-called boon obtained? Messages were delayed until they were useless; slow registering or recording instruments were substituted for rapid sound instruments; operators refused to work under managers who did not know their business, their places being filled by incompetent hands, which led to numerous errors; and, indeed, such was the disgraceful state of affairs that, had the Government, in framing the Telegraph Act, not rendered it illegal for private parties to run telegraph wires, and thus destroy their monopoly, a new line would have at once been created by the commercial public, who were great sufferers by the new régimen.

This derangement of a concern which had hitherto given the greatest satisfaction in its working to the majority of the public, and which was kept in efficiency by healthy competition, continued for a period of nine months, by which time the postal authorities were commencing to know a few of the intricacies of the electrical telegraph, and things ran pretty smoothly until December last, when a Government official wilfully delayed some important press telegrams, and, although he had rendered himself liable to twelve months' imprisonment, he was not prosecuted, and in the House of Commons his conduct was excused by the Postmaster General.

I think I have shown that if governing bodies are determined to take over telegraphic concerns, the public must be prepared for vexatious delays, and they also give the party in power a weapon which they will not be slow to use in times of electioneering excitement, and whenever it suits their purpose.

This agitation will materially depreciate the value of the company's stock in the market; and I have yet to learn that it is a wise policy on the part of any Government, by means of the power which it has at command, to take over wholesale and monopolise a concern which flourishes and gives the greatest satisfaction, owing to the enterprise and courage shown by its promoters.—I am, Sir, your obedient servant,

W. H. E.

CLEAR CREEK, Texas, June 12, 1872.

To the Editor of the Journal of the Telegraph:

The following message was received at B—.

N——, May 30th, 1872.

To H. B. Ryan, B—

Come to N—— immediately; very important. The operator will please have this delivered at once. Mr. Ryan will pay cost of delivering.

(Signed),

22 Paid. R. B. LOVE.

Now, Mr. Ryan lives at a point in the country fifteen miles from B—. Should the operator have the message delivered to Mr. Ryan, at a cost of five or six dollars? If Mr. Ryan refused to pay this, could the operator force him to do so? I say he could not, as he is not supposed to know the contents of a message, and should not act on that part of the message intended for him.

Please answer this through the JOURNAL, and oblige

C. C. C. Jr.

Answer.—Rule 10 prescribes, that whenever a message is to be forwarded by express or delivered by special messenger beyond the limits of office delivery, the receiver shall collect for such service and add the amount to the check, and the office receiving the same will check the amount against the transmitting office, the same as for *other lines*.

Managers may, upon receiving a deposit of money sufficient to cover all expenses, undertake to have messages delivered by special messenger, from any point at which this company has an office.

No receiver should take in a message requiring special delivery at some other office, without receiving a deposit sufficient to cover the cost of such special delivery, or unless such expense is guaranteed by a responsible party.

In a case like the above the receiver makes himself responsible for the cost of delivering the message, if the party to whom it was addressed should refuse to pay for it.

Mr. Ryan could not be compelled to pay for the delivery of the message, since he did not ask to have the service performed, nor can any person to whom a collect message is sent, be compelled to pay the charge, unless it is an answer to a message sent by such person, the charges upon which, had been guaranteed in advance. The office which sends a collect message, or a message with orders to collect for delivery, becomes responsible for the amount in case the person to whom it is addressed, refuses to pay the charges.

To the Editor of the Journal of the Telegraph:

Will you please inform me through the columns of the JOURNAL, how I may be enabled to make a good lightning arrester for the protection of my relay during thunder storms? By so doing, you will much oblige AMATEUR.

June 13, 1872.

Answer.—Lightning arresters are kept in stock by the Western Union Company, and can be obtained by any office by requisition upon the Superintendent. Until one is received, "Amateur" had better cut his relay out of circuit when in danger of damage from lightning.

To the Editor of the Journal of the Telegraph:

You will oblige me greatly by answering the following question:

Has a telegraph operator the right to go in a Western Union Telegraph Office, or in any other telegraph office, and send a message dead head?

D. J. R.

Answer.—No operator has the right to send a message free, unless it is approved by the manager of the office where the message originates. Rule 48 reads as follows:

"Private messages between the employees of the Company, must be restricted to those of an urgent social character, and approved by the Manager of the office from which they are sent. Copies of such messages must be regularly checked, and returned with other free business."

ANSWERS TO CORRESPONDENTS.

WHENEVER a Red message is received, Saturday night or Sunday morning, at any station where there is a Sunday delivery, it should be delivered on Sunday morning, the same as any other message; but Red messages should not be received from the customers for transmission, on Saturday night, with the promise of a Sunday morning delivery.

THERE are ten words in the following message: "Twenty-two John street, up stairs; with Starrs & Marcus."

IN a message signed "Smith & Jones, per Jones," the appendix to the signature should be counted if the customer desires its transmission.

THERE are nine words in the following message: "One hundred and fifty (150) dollars."

SELMA, Ala., June 26, 1872.

To the Editor of the Journal of the Telegraph:

In your issue of the 15th, there is a communication regarding the whereabouts of R. J. Fowler. Please state that I am, and have been for the last five years, at Selma, Ala.

Respectfully yours,

ROBERT J. FOWLER,
P. O Box 141.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, JULY 1, 1872.

CONGRESS AND THE POSTAL TELEGRAPH SCHEMES.

Congress has adjourned, and the various telegraph properties are safe from spoliation for a while longer. It is amazing to see the equanimity with which the Senate Post Office Committee has discussed and recommended a scheme so much akin to robbery, under the specious plea of public benefit.

It was Johnson, we believe, who defined the term "patriotism" as the last resort of scoundrels, and while we are not prepared to condemn in so sweeping a manner the action of the parties engaged in this latest attempt to scoop in for their own private ends the vast business built up by the energy and foresight of the existing telegraph companies, yet we cannot help believing that if the great cynic could once again assume his earthly existence, and becoming cognizant of the facts in connection with the schemes of the day to legalize the appropriation of the fruits of the labors of other men, under the guise of benefitting the dear people, he would see nothing to modify in the severity of his definition.

Of course we have here in view the so-called "Hubbard" scheme of Postal Telegraphs, which modestly calls upon Congress to create that *distinguished philanthropist* and his associates into a body corporate, and to grant to them full and plenary power to take possession and control of all telegraph property, and to operate it for their own private benefit.

Under this scheme, the owners of the telegraph property are to receive no adequate compensation for the rich prize which is so easily to drop into the hands of this fortunate lobbyist, while the public is to pay roundly through the post office department for the performance of the telegraph service. To the credit of the various House Committees who have had this scheme under consideration for the past four years, it must be said that they have never yet reported inits favor, or given it any countenance whatever, and we trust that they never will. But in the consideration of this scheme, many valuable hours have been wasted, and probably many more will be in future; while at every session of Congress the telegraph companies are required, at much expense and trouble, to defend their property against this insidious parasite, which seeks to attain its subsistence at the expense of the telegraph interests, to which it has dishonestly attached itself.

Among the recent resignations from the service of the Western Union Telegraph Company, is that of Mr. John Horn, Jr., for the last seven years Manager of the office in the New York Stock Exchange, who, on the first of June, entered his name among the list of the "bulls" and "bears" of Wall street. Mr. Horn was one of the oldest and best known operators in the country. In the new field he has entered, he has our best wishes for his success.

The excellence of the "Putt Mechanical Telegraph Instrument," and its adaptibility for the purpose for which it is intended, is well set forth in our advertising columns. During the past year there has been sold twelve hundred of these machines, and for the present the stock is exhausted,

So much for first class references and advertising in the Journal.

By referring to our advertising columns, it will be seen that "The Telegraph Supply and Manufacturing Company, Geo. B. Hicks, President," have succeeded to the business of the firm of Hicks & Shawk of Cleveland, O. The business of the late firm had increased so largely that their facilities were totally inadequate to meet it. The enlargement of facilities and the ample capital at command, with the well-known ability of Mr. Hicks, cannot fail to ensure success.

The new company also succeed to the business of "The Automatic Fire Alarm Company of Ohio."

Mr. Geo. F. Durant has been appointed Superintendent of the New York Division of the American District Telegraph Company.

The Telegraph during the Philadelphia Convention.—The Western Union Telegraph Company transmitted over their wires during Wednesday and yesterday the enormous number of 983,742 words of report to the newspaper press of the country. The regular business was in no manner interfered with by this marvellous achievement.—*Phila. Enquirer.*

Since 1865 the Great Eastern has been exclusively devoted to submarine telegraphic purposes, and during that time has laid in various parts of the world, no less than 20,000 miles of deep-sea electric cable, all of which is now in good working order. The capital invested in those various cables, is estimated at $35,000,000. This huge vessel was alone capable of affording the accommodations required for stowing away the thousands of miles of heavy cable necessary, and, above all, she alone was found to possess the evenness requisite for paying it out without difficulty or disaster. She has laid down submarine cables in all parts of the world. The British, Australian, China, Submarine, British Indian, and British Indian Extension, are only a few of the enterprises in which she has been engaged. She has traversed the Pacific, the Southern and Indian Oceans, as well as the Atlantic, in her errand of civilization.

Post Office Telegraphs.—The total number of messages forwarded from Postal Telegraph stations in the United Kingdom during the week ending the 1st of June, 1872, and during the corresponding week of 1871. Week ended 1st June, 1872, 288,400; week ended 3d June, 1871, 202,049; increase in the week of 1872 on that of 1871, 86,351.

At the meeting of the Inventors' Institute at London, on Thursday Evening, May 23d, Mr. F. H. Varley, F.R.A.S., read a paper on inventions relating to telegraphy. After explaining the early attempts to establish telegraphy by Sir Francis Ronalds, and its practical introduction by Sir F. Cooke and Sir C. Wheatstone, and referring to the improvements of Mr. Cromwell Varley in insulators, some of which were exhibited, and after alluding to various systems of telegraphs, instruments of an entirely new construction, invented by the reader and his brother Theophilus Varley, were exhibited, comprising a new form of key instrument for transmitting messages. A relay regulator was displayed, for controlling an electric current in a manner not unlike the govenor of a steam engine, so that when the current flowing into the relay is too powerful for rapid working, the magnetism developed is at once cut off. An improvement was also shown in the ink-writing Morse instrument, which consisted in the substitution of a self-feeding and repointing pencil rotating by clockwork for the ink-wheel arangement. It was explained that the durability of a pencil-marked was such that ¾ of an inch of the black cylinder would last a month on the busiest circuits.

A prospectus has been issued of the Economic Telegram Company (Limited), with a capital of £150,000, in shares of £15, to purchase and carry out invention by which nearly all kinds of telegraphic messages "can be so effectually condensed as to send with perfect accuracy from five to ten ordinary telegrams as one." The business of the Company will be merely that of an agency, involving no costs of construction or maintenance of cable wires. Under these circumstances, as the sum to be paid for the invention is not stated, the necessity for raising such an amount of capital as £150,000, is not perfectly clear.

Hydro-Electric Submarine Cable.—M. Ferdinand Tommasi, 69, Avenue de l'Alma, Paris, an engineer and inventor of considerable eminence and repute, has just perfected an invention under the above title, which is attracting attention, and likely to excite considerable interest. He proposes to employ it for submarine telegraphy, and to substitute for the ordinary electric conducter, the cable, a simple tube of copper, containing, as it were, a thread or column of water, which is stated to transmit effectually and instantaneously every impulse communicated by pistons, and not only that, but to permit such impulses to be transmitted in opposite directions at the same time. M. Tommasi's experiments have been conducted upon a limited scale, but he affirms that he can absolutely obtain the following results:—1. A speed of transmission of 600 signals per minute, even at 4000 kilometres distance, (nearly 2500 miles English). 2. Simultaneous exchange of correspondence, any number of dispatches being effected at once by the same cable. 3. Adaptability to any recording instrument whatever, Quadrant, Morse, Printing, &c., quite automatically. 4. Economy in first cost, durability, and increase in returns.

The actual duration of a flash of lightning does not exceed the millionth part of a second. But the retina of the human eye retains the impression of the electrical flash for a much longer period.

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MEASURING THE VELOCITY OF ROTATION.—Professor A. E. Dolbear suggests, in the *American Journal of Science*, a simple and effective method of determining the velocity of rotation of wheels and shafts. Upon the face, or upon the periphery of the rotating object, he fastens smoked paper, and this he touches with a point of rubber which is attached to one branch of a vibrating tuning-fork, having a known rate of vibration. The fork is to be so held that the direction of its vibrations will be at right angles to the line of motion of the shaft. By counting the number of undulations made, on a given extent of the smoked paper, the speed of rotation is at once indicated. Thus, if the fork makes 100 vibrations in a second, and one vibration is recorded on the smoked paper, in a space covering one-half the circumference of the wheel or shaft, or two vibrations within the entire circumference, it is evident that the rate of rotation is 50 revolutions per second. By this simple and easy method the velocity of rotation of gyroscope disks, and of all kinds of shafts and wheels, may be readily ascertained.

ICE FROM FIRE.—A platina crucible is made and, maintained red hot over a large spirit lamp. Some sulphuric acid is poured into it. This acid, though at common temperature one of the most volatile of known bodies, possesses the singular property of remaining fixed in the red-hot crucible, and not a drop of it evaporates; in fact, it is not in contact with the crucible, but has an atmosphere of its own interposed. A few drops of water are now added to the sulphurous acid in the red-hot crucible. The diluted acid gets into immediate contact with the heated metal, instantly flashes off, and such is the rapidity and energy of the evaporation that the water remains behind, and is frozen into a lump of ice in a hot crucible, from which, seizing it the moment before it again melts, it may be thrown out before the eye of the astonished observer. This is, indeed, "a piece of natural magic," and as much like a miracle as any operation of the forces of nature could produce. It is certainly one of the most singularly-beautiful experiments imaginable.

BORN.

HORNE.—June 12, 1872, to O. A. Horne, Manager W. U. Telegraph Office, Cuthbert Ga., a son.

HAYGOOD.—June 15, 1872, to A. Watts Haygood, Manager W. U. Telegraph Office, Fort Gaines, Clay Co., Ga., a son.

LYNCH.—June 15, 1872, to Frank J. Lynch, Manager W. U. Telegraph Office, West Point, Neb., a daughter.

THOMPSON.—May 18, 1872, to F. T. Thompson, Manager W. U. Telegraph Office, Lynn, Ill., a daughter.

MARRIED.

BURLEY—WEST.—In Philadelphia, June 6, 1872, by Rev. E. G. Brooks, William S. Burley, Western Union Stock Board Office, to Corina Florence, daughter of Mr. James West.

CHRISTY—GREEN.—At Jamesville, N. Y., May 2, 1872, by Rev. J. W. Watson, Charles H. Christy, Manager W. U. Telegraph Office, Jamesville, N. Y., to Miss Augusta E. Green of same place.

HOPCRAFT—HICKMAN.—June 4, 1872, at Pittsburgh, Pa., Mr. James Hopcraft, Train Dispatcher C. B. & Q. R. R., Galesburg, Ill., to Miss Mattie Hickman, of Chariton, Iowa.

MCKEE—JACKSON.—At Seville, O., May 27, 1872, by Rev. T. C. Warner, T. F. McKee, operator at Palestine, O., to Miss Florence Jackson of Loudonville, Ashland Co., O.

DIED.

ENGLERTH.—In Savannah, Ga., May 18, 1872, Harry W., infant son of Joseph A. Englerth, formerly of Martinsburg, W. Va., aged 15 months.

PIERSON.—Wednesday, June 19, 1872, at Olney, Ill., J. Knox Pierson, in the 34th year of his age.

WILLIAMS.—June 20, 1872, at Baltimore, Md., of consumption, Rudolph R. Williams, of the Franklin Telegraph Co., aged 23 years, 5 months, and 15 days.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
July 1, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since June 15, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

* Aldrich, Minn.
* Anthon, Minn.
Aulac, N. B., tariff same as Sackville, N. B.
* Big Coolie, Dac.
374 Bogue Chitto, Miss.
158 Beattie, Ks., re-opened.
309 Bridgeport, Ill.
* Bar Harbor, Mount Desert, Me., re-opened, tariff same as heretofore.
* Chaska, Minn.
6 Danforth, Me.
480 Douglass, Texas.
47 Englishtown, N. J., check Jamesburg, N. J.
* Farmington, Utah.
* Georgetown, Minn.
* Glyndon, Minn.
* Glenbeulah, Wis.
Hutchinson, Ks., tariff 10c. more than Newton, Ks.
* Hawley, Minn.
45 Hart's Falls, N. Y.
367 Hale, Iowa.
359 Hematite, Mo.
* Island Lake, Minn.
* Juniata, Neb.
* Kimbles, Pa.
* Kimberly, Minn.
* Lakeside, Minn.
* Lavalle, Wis.
* Little Coolie, Dac.
* Moorhead, Minn.
* Mountain Lake, Minn.
* New London, Wis.
* Oakfield, Wis.
358 Pleasant Plains, Ill.
* Perham, Minn.
* Princeton, Wis.
* Pickets, Wis.
367 Rome, Jones County, Iowa.
46 Rosendale, N. Y., heretofore an Other Line office.
* Randon Lake, Wis.
Sedgwick City, Ks., tariff 10c. more than Newton, Ks.
337 Rochester, Ill.
397 Shocks, Iowa,
* Sauk Centre, Minn.
* Seymour, Wis.
* Sioux City Junction, Minn.
298 St. Mary, Ill.
465 St. Francis, Kansas.
150 Shaws, Pa.
159 Shenango, Pa.
* Thomson, Minn.
Wichita, Kansas, tariff 10c. more than Newton, Ks.
* Wadena, Minn.
* Waldo, Wis.
* Wauwatosa, Wis.
* Withington, Minn.
* Wellsboro, Pa.

SUMMER OFFICES RE-OPENED.

27 Bethlehem, N. H.
27 Crawford House, N. H.
46 Cornwall, N. Y.
27 Glen House, N. H.
23 Gorham, N. H.
20 Jackson, N. H.
169 Little Mountain, O.
40 Lebanon Springs, N. Y.
37 Lake Mahopac, N. Y.
27 Mount Washington, N. H.
27 Mount Washington Depot, N. H.
67 Mount Pleasant, Del.
* Narragansett Pier, R. I.
* Overlook Mountain House, N. Y.
Point-du-Chene, N. B.
27 Profile House, N. H.
* Rocky Point, R. I.
* Spencer Springs, N. Y.
27 Twin Mountain House, N. H.
143 Yellow Sulphur Springs, Va.
20 White Mountain House, N. H.
27 Waumbeck House, Jefferson N. H.

Business for Twin Mountain House, White Mountain House and Mount Washington Depot, N. H., should be checked to Crawford House, N. H., and Mount Washington, N. H., to Glen, House, N. H.

The tariff to or from the "Summer Offices" in N. H. named above, "except Gorham" is 20 cents more than present rate by "square." Tariff to Gorham from offices in Vt. and N. H., will be 20c. more than square rate; from all other offices tariff will be 25 and 1 "for other lines" from Portland, Me. check Portland.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.		*Leaves this Line.*
Aldrich, Minn.,	150	10	Chicago, Ill.
Anthon, Minn.	150	10	"
Big Coolie, Dac.,	200	13	"
Chaska, Minn.,	100	7	"
Farmington, Utah,	50	20*	Salt Lake City, Utah.
Georgetown, Minn.,	200	13	Chicago, Ill.
Glenbeulah, Wis.,	50	8	"
Glyndon, Minn.,	200	13	"
Hawley, Minn.,	200	13	"
Island Lake, Minn.,	150	10	"
Juniata, Neb.,	155	10	Plattsmouth, Neb.
Kimbles, Pa.,	20	2	Honesdale, Pa.
Kimberly, Minn.,	150	10	Chicago, Ill.
Lakeside, Minn.,	200	13	"
Lavalle, Wis.,	60	4	"
Little Coolie, Dac.,	200	13	"
Moorhead, Minn.,	200	13	"
Mountain Lake, Minn.,	150	10	"
New London, Wis.,	75	5	"
Oakfield, Wis.,	50	8	"
Perham, Minn.,	150	10	"
Princeton, Wis.,	60	4	"
Pickets, Wis.,	60	4	"
Randon Lake, Wis.,	35	2	"
Sauk Centre, Minn.,	150	10	"
Seymour, Wis.,	75	5	"
Sioux City Junc., Minn.,	100	7	"
Thompson, Minn.,	150	10	"
Wadena, Minn.,	150	10	"
Waldo, Wis.,	35	2	"
Wauwatosa, Wis.,	35	2	"
Withington, Minn.,	150	10	"
Wellsboro, Pa.,	35	2	Corning, N. Y.

* Additional five words or less.

OFFICES CLOSED.

Kingston, Md., Kirkwood, Del., Oakwood, Texas, and Stewartsville, N. J.

GENERAL INFORMATION.

The name of the office heretofore known as Windham Station, O., has been changed to Mahoning, O., and Calhoun, O., changed to Windham, O.; and Crow Wing, Minn., changed to Motley, Minn., and that of Oak Lake, Minn., changed to Audubon, Minn.

Covington, Va., will hereafter be checked as an Other Line Office, "Tariff for Other Lines" 65 and 4 from Richmond, Va., check Richmond, also Milford, Pa., with "Tariff from Other Lines" 20 and 2 from Port Jervis, N. Y., check Port Jervis, N. Y.

The following offices will hereafter be checked direct: South New Market, N. H., Burnham and Clinton, Me.

Hereafter the "Tariff for Other Lines" to Overlook Mountain House and Woodstock, N. Y., will be 35 and 2 from Rondout, N. Y.

The P. O. address of Shenango, Pa., is "Shenango," Greenville, Pa., P. O.

The tariff to square 6 will be 10 cents more than to square 10.

The office at 377 Rome, Iowa, is in Henry Co.

OFFICES HAVING "SPECIAL SHEET A"

Will hereafter check Logan Iron Works, Lewistown, Pa., same as "special rate," to Lewistown, Pa.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, June 29, 1872.

On and after July 8, *Baldwinsville, N. Y.*, will be added to the list of Money Order offices in Transfer Agent S. B. Gifford's District.

G. H. MUMFORD, Vice-President.

TELEGRAPHERS' INSURANCE ASSOCIATION.

The acknowledgment of receipt on any one assessment is to be understood as an acknowledgment for all previous assessments.

Assessment No. 28.

422 1240

No. 29.

332 712 1493

No. 30.

22	31	37	51	58	65	70	84	90	100	126
138	215	252	288	289	311	344	357	438	447	456
484	512	512	575	605	626	627	659	660	667	787
803	815	851	883	905	929	979	1024	1038	1043	1058
1069	1100	1101	1105	1106	1107	1108	1109	1110	1112	1113
1115	1116	1117	1119	1120	1121	1122	1123	1125	1130	1131
1164	1180	1187	1207	1216	1291	1324	1361	1369	1395	1397
1414	1429	1439	1483	1493	1553	1571				

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THE SERVICE.

WESTERN UNION TELEGRAPH CO.

APRIL, 1872.

Appointments.

M. J. Reed.....Manager.....Jamaica, L. I.
Josie G. Curtis..... " .....Roslyn, L. I.
D. L. Findlay .....Operator.....New York
W. W. Gove..... " ..... "
P. J. McHugh..... " ..... "
J. A. McDonald..... " ..... "
F. H. Siebert..... " ..... "
R. J. Williams..... " ..... "
Emily Harris..... " ..... "
Mary Kennedy..... " ..... "
E. P. Wortman..... " ..... "
Geo. Farrell..... " ..... "
E. H. Murphy..... " ..... "
A. J. Hatch..... " ..... "
J. H. Jarvis.....Manager....Fredericton Junction, N. B.
R. J. Freeze..... " .....Harvey, N. B.
C. J. Hoyt.....Operator..... St. John, N. B.
O. Johnson.....Manager..... Westfield Station, N. B.
A. T. Creelman.....Operator..... Halifax, N. S.
Robert McLearn.....Manager.....Richmond, N. S.
Jessie McDonald.....Operator.....Tatamagouche, N. S.
W. P. Holder.....Manager.....Lancaster, Mass.
G. H. Newland..... " .....Newbury, Vt.
J. W. Waite..... " .....North Hatfield, Mass.
Thomas Stewart, Jr...Operator.....Rutland, Vt.
C. A. Tinker..... " .....St. Albans, Vt.
L. S. Hayes..... " .....White River Junc., Vt.
Ella French.....Manager.....Framingham, Mass.
M. A. Jackson..... " .....Birmingham, Conn.
Ella M. Kite..... " .....East Hartford, "
F. H. Goddard..... " .....East Brookfield, Mass.
L. A. Perry..... " .....East Killingly, Conn.
L. W. Lord.....Operator.....Hartford, "
A. L. Page..... " .....New Haven, "
T. H. Windsor..... " .....New London, "
Ella P. Cobb.....Manager.....North Dighton, Mass.
W. E. Beach..... " .....Norfolk, Conn.
R. B. Adams, Jr..... " .....Palmer, Mass.
Myra Spellman..... " .....Stafford, Conn.
A. Van Dusen.....Operator.....Stockbridge, Mass.
G. D. Soule.....Manager.....South Abington, "
G. H. Lowe.....Operator.....Waterbury, Conn.
W. H. Allen..... " .....Boston, Mass.
Charles Davis..... " .....Albany, N. Y.
H. J. McCormick..... " ..... "
Peter L. Kilmer.....Manager.....Amenia, N. Y.
Van V. Whitbeck..... " .....Coeymans, N. Y.
Alonzo Flack..... " .....Claverack, N. Y.
E. Merrick..... " .....Williamstown, Mass.
S. R. Van Werner.....Operator.....Oswego, N. Y.
B. H. Griffin..... " .....Suspension Bridge, N. Y.
P. G. Wright..... " .....Syracuse, N. Y.
E. C. Carley.....Manager.....Coventry, N. Y.
J. A. Hartman.....Operator.....Philadelphia, Pa.
Robert J. Myers..... " ..... "
Charles F. Laddington. " ..... "
Nora M. Lesmore.....Manager.....Bath, Pa.
Jesse W. Holton.....Operator.....Baltimore, Md.
J. R. Eschelman..... " .....Allentown, Pa.
A. D. Webb..... " .....Bloomsburgh, N. J.
F. P. W. Keep.....Manager.....Clearfield, N. J.
G. B. Wilde..... " .....Cornwells, Pa.
Geo. M. Lane..... " .....Crawford, N. J.
James L. Burket .....Operator.....Harrisburg, Pa.
J. W. Watkins..... " .....Highbridge, N. J.
W. W. Smith..... " .....Hyde Park, Pa.
W. J. Pedrick.....Manager.....Morrisville, Pa.
Eugene C. Adams..... " .....New Brunswick, N. J.
S. J. Trusman.....Operator.....Roselle, N. J.
Charles Boone..... " .....Wilkesbarre, Pa.
Geo. L. Sparks.....Manager.....Abington, Pa.
C. W. Hall.....Operator.....Media, Pa.
E. W. Straup.....Manager.....Rockport, Pa.
R. E. Jameson.....Operator.....Tyrone, Pa.
C. L. W. Kelply..... " .....Washington, D. C.
E. C. Stewart..... " ..... "
J. E. Bishop.....Manager.....Warsaw, N. Y.
E. S. Patten.....Operator.....Milwaukee, Wis.
V. Wallace, Jr..... " .....Chicago, Ill.
W. Conner..... " ..... "
F. N. Benson..... " ..... "
E. L. Clapp.....Manager.....Livide, Col.
John Valle.....Operator.....Fort Benton, M. T.
E. A. Masters.....Manager.....Idaho, Col.
W. A. Nichols.....Operator.....Omaha, Neb.
H. C. Marks..... " .....Salt Lake, Utah.
Lawrence Smith.....Manager.....Cunningham, Pa.
W. S. Schroeder.....Manager.....Cash Up City, Pa.
J. A. Benn..... " .....Catfish, Pa.
J. W. Stearns..... " .....Fagundus, Pa.
F. Miller..... " .....Freeport, Pa.
W. P. Walsh..... " .....Lincolnville, Pa.
F. H. Walton..... " .....Sharpsburg Bridge, Pa.
W. C. Tingle.....Operator.....Wheeling, W. Va.
J. D. Potts..... " .....Pittsburg, Pa.
E. L. Nims.....Manager.....Lexington, Mich.
J. W. Thompson.....Operator.....Port Huron, Mich.
G. H. Calkins..... " .....Cleveland, O.
E. C. Stockwell..... " ..... "
D. E. Corbett..... " .....Detroit, Mich.
Mattie Lieb..... " ..... "
Rufus D. Couch..... " .....Arcadia, Ind.
James E. Friend..... " .....Indianapolis, Ind.
E. C. Howlett..... " ..... "
Charles A. Laubach.... " .....Lafayette, Ind.
Charles N. Howlett.... " .....Terre Haute, Ind.
J. L. Adams.....Manager.....Dresden, O.
W. B. Swerer..... " .....New Hope, O.
James F. Lilly..... " .....Xenia, O.
E. A. Mead.....Operator.....Cincinnati, O.
E. Orton..... " ..... "
C. A. Peel..... " ..... "
W. G. Penderry..... " ..... "
S. Roberts..... " ..... "
C. A. Allen..... " ..... "
O. G. O'Gara..... " ..... "
Geo. W. Vernon..... " .....Barksdale, Va.
J. W. Potter.....Manager.....Athens, Ga.
J. F. Wilbur.....Operator.....Augusta, Ga.
L. A. Pipkin.....Manager.....Beaufort, S. C.
A. L. Woodward..... " .....Monticello Junction, Fla.
L. W. Minn..... " .....Quincy, Fla.
W. J. Nelson.....Operator.....Montgomery, Ala.
W. J. Cook..... " .....Memphis, Tenn.
R. K. Bailey.....Manager.....Wytherville, Va.
M. A. Clark..... " .....Burnsville, Miss.
C. Murrill..... " .....Iuka, Miss.
W. B. Williams..... " .....Clarendon, Ark.
J. T. Floyd..... " .....Bartlett, Tenn.
Peter Fowler.....Operator.....Memphis, Tenn.
W. H. Harriwell.....Manager.....Wesson, Miss.
F. A. Hawkins..... " .....Mumfordville, Ky.
L. B. McFarlane.....Operator.....Nashville, Tenn.
G. D. Brownlie.....Manager.....Livingstone, Ky.
J. R. Hooper..... " .....Highland, Texas.
M. J. Land .....Operator.....New Orleans, La.
John E. Clarke.....Operator..... "
T. M. Shefers..... " .....Monroe, La.

Resignations, &c.

H. S. Martin.....Operator.....New York.
J. F. Moore..... " ..... "
E. N. Taylor..... " ..... "
R. D. Williams..... " ..... "
Nellie Barbour..... " ..... "
C. A. Currie.....Manager....Fredericton Junction, N. B.
C. J. Hoyt..... " .....Annapolis, N. S.
D. A. Story..... " .....Richmond, N. S.
H. Bailey..... " .....Lancaster, Mass.
H. T. Johnson..... " .....Newbury, Vt.
James D. Donnell..... " .....North Hatfield, Mass.
W. G. Jamieson.....Operator.....Rutland, Vt.
C. L. Brigham..... " .....St. Albans, Vt.
M. A. Leeke.....Manager.....Birmingham, Conn.
A. McInery..... " .....East Hartford, "
M. M. Preston..... " .....East Killingby, "
E. R. Colton.....Operator.....Hartford, "
Frank Iago..... " .....New London, "
Frank K. Chace.....Manager.....North Dighton, Mass.
Kate Howe..... " .....Palmer, "
C. E. Dorman..... " .....Stafford, Conn.
J. O. Jarat.....Operator.....Stockbridge, Mass.
R. W. Cook.....Manager.....South Abington, "
E. Fox.....Operator.....Boston, "
Frank B. Rae..... " .....Albany, N. Y.
Eugene A. Gay..... " ..... "
J. W. Gay.....Manager.....Amenia, N. Y.
D. Edwards, Jr..... " .....Claverack, N. Y.
Ida Honey..... " .....Williamstown, Mass.
H. J. McCormick.....Operator.....Oswego, N. Y.
W. F. Jones..... " .....Philadelphia, Pa.
Wm. E. King..... " ..... "
Hugh Wallace..... " .....Baltimore, Md.
William C. Canby..... " ..... "
W. A. Clark..... " .....Bloomsburg, N. J.
W. L. Ruth.....Manager.....Clearfield, N. J.
James H. Walker.....Operator.....Highbridge, N. J.
Charles W. Price.....Manager.....New Brunswick, N. J.
C. R. Richards.....Operator.....Roselle, N. J.
W. D. Garrison..... " .....Wilkesbarre, Pa.
A. P. Lowman..... " .....Media, Pa.
E. C. Adams..... " .....Washington, D. C.
G. A. Jenks.....Manager.....Warsaw, N. Y.
E. J. McRaney.....Operator.....Milwaukee, Wis.
G. W. Shape..... " ..... "
E. N. Snider..... " .....Chicago, Ill.
H. McMillan..... " ..... "
C. H. Norris..... " ..... "
W. H. Mills..... " ..... "
J. J. Powers..... " ..... "
T. P. Curry..... " ..... "
J. P. McClure..... " .....Jeffrson City, Mo.
Geo. Bittenbender..... " .....Salt Lake, Utah.
H. G. Mosier.....Manager.....Trinidad, Col.
J. Brien..... " .....Cunningham, Pa.
Ed. Davis, Jr..... " .....Cash Up City, Pa.
R. R. Wise..... " .....East Foxburgh, Pa.
W. M. Dunham..... " .....Fagundus, Pa.
R. W. Purdum..... " .....Freeport, Pa.
J. L. McBratney..... " .....Harrisburg, Pa.
D. W. Tryon..... " .....Lincolnville, Pa.
F. A. Stumm..... " .....Oil City, Pa.
W. E. Schroeder.....Operator.....Petroleum Centre, Pa.
M. E. Luce.....Manager.....Pioneer, Pa.
F. Watson..... " .....Sharpsburg Bridge, Pa.
Geo. Makle.....Operator.....Wheeling, W. Va.
F. M. Smith..... " .....Pittsburg, Pa.
L. McMullen..... " ..... "
W. J. Dill.....Manager.....Lakeport, Mich.
A. R. Schell..... " .....Lexington, "
G. H. Burwell.....Operator.....Cleveland, O.
S. T. Davidson..... " .....Buffalo, N. Y.
E. W. Dennis..... " .....Indianapolis, Ind.
Giles H. Williams..... " .....Lafayette, Ind.
E. F. Sheets..... " .....Terre Haute, Ind.
S. B. Dorsey.....Manager.....Dresden, O.
W. E. King..... " .....New Hope, O.
C. S. Rogers..... " .....Xenia, O.
E. L. Snyder.....Operator.....Cincinnati, O.
J. E. Hadley..... " ..... "
G. H. Everett..... " ..... "
M. D. Dailey..... " ..... "
A. B. Fowekes..... " .....Barksdale, Va.
H. R. Troy..... " .....Athens, Ga.
W. E. Seward..... " .....Augusta, Ga.
H. C. Earl..... " .....Beaufort, S. C.
H. Van Antwerp..... " .....Columbia, S. C.
J. A. Wilson..... " .....Quincy, Fla.
John W. Potter, Jr..... " .....Live Oak, Fla.
E. C. Stewart..... " .....Mobile, Ala.
T. J. Bentley.....Manager.....Oxford, Ala.
H. N. Perkins..... " .....Bristol, Tenn.
W. D. Evans..... " .....Burnsville, Miss.
W. A. Clark..... " .....Iuka, Miss.
Curl Lee..... " .....Clarendon, Ark.
C. W. Priddy..... " .....Bartlett Tenn.
C. M. Green.....Operator.....Memphis, "
C. M. Patch..... " ..... " "
A. Cole.....Manager.....Wesson, Miss.
L. Guest..... " .....Mumfordville, Ky.
John Loueran.....Operator.....Nashville, Tenn.
Thomas Johnson..... " .....Livingston, Ky.
T. J. Cassell..... " .....Louisville, Ky.
J. D. C. Elmore.....Manager.....Highland, Texas.
L. B. McFarlane.....Operator.....New Orleans, La.
J. K. Dunbar..... " ..... "
E. W. Sewell..... " ..... "
E. D. Morton..... " ..... "
A. C. Barker..... " ..... "

Transfers.

	From	*To*
OPERATOR.		
L. T. Moore	New York	Glen Cove.
MANAGER.		
L. W. Hoyt	Wolfville	Annapolis, N. S.
OPERATORS.		
Julia E. Huertis	Tatamagouche	Pugwash, N. S.
Ida White	New Hamburgh	New York.
Emma Tibbals	New York	New Hamburgh.
E. J. Hirschberg	Allentown	Easton, Pa.
W. H. Pearson	Trenton	Beverley, N. J.
J. B. Shine	Easton	Perth Amboy, N. J.
W. H. Boggs	Harrisburg, Pa.	Bath, Md.
L. B. Foley	Hyde Park	Scanton, Pa.
W. F. Curren	Easton	"
E. G. Foote	New York	Chicago.
MANAGERS.		
S. H. P. Affiack	Idaho, Col.	Trinidad, Col.
Geo. A. Brooks	Armstrong Run, Va.	East Foxburg, Pa.
G. W. Bansman	Pittsburg	Foxburg, Pa.
OPERATORS.		
C. D. Sprague	Cleveland.	Tiffin, O.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 16. NEW YORK, JULY 15, 1872. WHOLE NO. 113.

GALVANOMETERS.

Professor Œrsted, of Copenhagen, discovered in the year 1819 that a magnet, freely suspended, tends to assume a position at right angles to the direction of a current of electricity passing near it.

If a magnetic needle is poised upon a pivot, so as to allow a free horizontal motion, and a wire, whose direction is north and south, and which is traversed by an electric current, passes directly over and parallel to it, the needle will be deflected towards the east, or west, according to the direction of the current. If the wire is placed in the same direction below the needle, the deflection will be the reverse of that produced by the same current when flowing above. If the current is passing from south to north in the wire, the north pole of the needle will turn to the west when below the wire, and to the east when above it.

The manner in which a needle should turn when influenced by a current is easily kept in mind by Ampere's rule: suppose the diminutive figure of a man be placed in the circuit, so that the current shall enter by his feet and leave by his head, when he faces the needle, its north pole always turns to his left. If the current enters by his head, under the same conditions, the north pole of the needle will turn to his right.

In the accompanying illustrations the figure of the man is represented by the wire *A*, *B*, and the needle by *N*, *S*. In figure 1 the current enters by his feet. and in figure 2 by his head. If the needle were placed on the other side of the wire its deflection would be reversed.



Fig. 1.



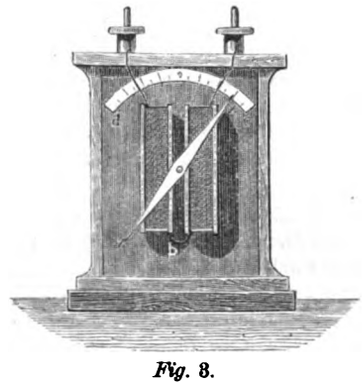
Fig. 2.

When a magnetic needle is placed under a straight wire, through which a current passes, it deflects to a certain extent, and when the wire is bent so as also to pass below the needle it deflects still more. This is easily understood from the above rule. The supposed figure has to look down to the needle when in the upper wire, and to look up to it in the lower wire, so that his left hand is turned in different ways in the two positions.

The current in the upper and lower wire moves in opposite directions, thus changing in the same way as the figure, and the deflection caused by both wires is in the same direction. By thus doubling the wire the deflecting force is doubled. If the wire be carried a second time around the needle, the effect will be again doubled, and by a still further increase in the number of turns a corresponding increase in force will be obtained. Thus a very feeble current, whose action would be scarcely sensible if the wire by which it is transmitted made but one convolution, is able to exert a very marked action when the number of convolutions becomes considerable. This is done by insulating the wire so that the different convolutions may be juxtaposed and superposed, without causing a direct metallic communition from one convolution to another, and thus compel the current to traverse its entire length. This apparatus, which was original with Schweigger, is called a galvanometer, and affords the most convenient and accurate means for measuring the strength of a galvanic current which has ever been devised.

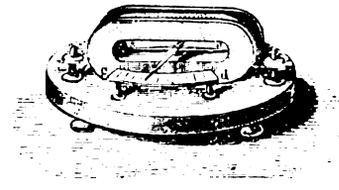
Galvanometers are made in many forms and for various purposes. In some cases the needle hangs vertically, and is kept in its normal position by gravitation, the lower end being heavier than the upper; while in other cases the needle is poised in a horizontal position like that of a mariner's compass, or supended by means of a silk fiber.

The vertical galvanometer (fig. 3) requires no adjustment, as the north end of the inner needle is made sufficiently heavy to keep it in a vertical position; but it is not as sensitive as the other forms, and as the force with which a current acts upon it depends on its magnetism, which is constantly decreasing, its indications vary from time to time.


Fig. 3.

In the above cut *Z*, *Z* represent the needle, whose angle of deflection is proportional to the quantity of electricity flowing through the coils, the direction in which it moves indicating the direction of the current. The scale *d*, *e*, is divided into two equal parts in the centre of which is the *o* point where the upper portion of the needle rests, when no current is passing through the coils; from the *o* point the scale is divided to the right and left into degrees, by means of which the angle of deflection of the needle can be read.

In a horizontal galvanometer the needle is kept in its place by its tendency to point north and south through the action of the earth's magnetism, and therefore the feebler the magnetism of the needle the less resistance will it offer to being moved by the current, while on the other hand the current acts with less force on a feeble magnet, and thus the instrument remains constant. In constructing a horizontal galvanometer (fig. 4) the wire is coiled


Fig. 4.

round a wooden or metal frame, so as to leave between its lower and upper surface the smallest possible space, in the interior of which the magnetised needle *s*, *n*, is suspended. The angle or number of degrees through which the magnetised needle is moved is indicated upon the scale *e*, *d*, by the pointer *z*, and shows the quantity of electricity passing through the coils, while the direction in which it moves, indicates the direction of the current.

In order to increase the sensibility of the galvanometer, Professor Cummings suggested the idea of neutralising the directive force of terrestial magnetism by employing two needles, as nearly alike as possible, placed parallel to each other, with their poles in opposite directions and suspended so as to move freely by a thread without torsion. Magnets so arranged have little tendency to place themselves in the magnetic meridian, as the one would move in a contrary direction to the other. If they were of exactly the same power they would remain indifferently in any position. As they cannot, however, be so accurately poised as this they always take up a fixed position, arising from the one being somewhat stronger than the other. Such a compound needle is called astatic, as it stands apart from the directing magnetic influence of the earth.

If an astatic needle be placed in a coil, so that the lower needle be within the coil and the upper one above it, its deflection will be greater than a single needle, because the power which keeps the needle in its fixed position is small and the needle is more easily influenced; and also because the force of the current is exerted in the same direction on two needles instead of one.

An astatic needle so placed in a coil constitutes an astatic galvanometer. The upper needle moves on a graduated circle, from which the number of degrees that the needle deflects may be read off. When deflection takes place the different portions of the coil are differently situated with respect to the needle from what they are at zero, and therefore

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the deflecting force of the coil differs with the position of the needle, so that the deflection caused by different currents are not proportional to the angles of deviation above 20°.

There is another circumstance which prevents the angle of deviation from being proportional to the quantity of current passing through the galvanometer, viz.: that the directive force of the globe, which, by tending to bring back the needles into the magnetic meridian, produces equilibrium with the force of the current that moves it from it, is proportional, not to the angles, but to the sines of the angles of deviation; and that from about 20° the difference between the arc and its sine, becomes too considerable to permit of their being taken indifferently for each other.

In the sine galvanometer or in the tangent galvanometer these sources of error are avoided. The sine galvanometer is composed: first, of a vertical metallic circle *G*, *H*, (fig. 5), having upon its circum-

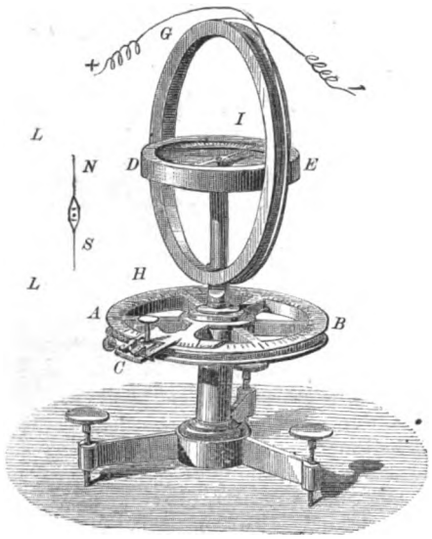


Fig. 5.

ference an orifice sufficiently deep and wide to contain the insulated wire which is wound round the circle and constitutes the coil; second, of a magnetised needle *I*, poised upon a pivot in the middle of the circle *E*, *D*, and which receives the influence of the multiplicator; third, of a divided circle *A*, *B*, maintained in a perfectly horizontal position, and over which the movable transom *C*, carries the multiplicator *G*, *H*, and its needle. A system of levels and binding screws permits of the establishment of the rigorous horizontal of the circle *A*, *B*. The instrument is placed north and south, and when the circle *G*, *H*, and the magnetic needle are both in the plane of the magnetic meridian, the apparatus is at the zero of the division. When a current is sent through the wire which surrounds the circle *G*, *H*, the needle is deviated in proportion to the magnetic force which is induced by the current. The transom that carries the multiplier is then turned until it is brought again into the plane of the needle. In order to conveniently observe the exact direction of the needle a copper pointer with an index line is fixed at right angles upon it. The needle is exactly parallel to the mean plane of the multiplier when the index line of the pointer falls beneath the wire of a lense that is fixed to the movable piece upon which the galvanometer is adjusted. When the needle is deviated by the passage of the current through the multiplier, the transom is turned until the wire of the lense coincides with the index line, and the division traced upon the fixed circle indicates the number of degrees it was necessary to turn it from 0 in order to obtain this coincidence. The strength of the current is proportional to the sine of the angle measured upon the circle *A*, *B*, by the movement of the alidade *C*.

In this apparatus the needle preserves the same position in relation to the current which consequently acts upon it in the same manner. The extent of the deviation must depend therefore solely upon the quantity of the current passing through the galvanometer.

As the sensitiveness of the apparatus depends upon the number of convolutions of the conducting wire upon the circle, it can be made applicable to any strength of current by increasing or diminishing the number of convolutions.

THE AIR FILTER.

Professor Tyndall, after a long series of experiments with atmospheric air, concluded that many of our most formidable diseases, such, for example, as small pox, cholera, and typhoid were propagated by the flotation of invisible particles in the atmosphere, and that, by the use of a suitable breath filter, it would be practicable for any person to enter an infected apartment without danger. The same apparatus, he stated, might be used by firemen, enabling them to enter buildings filled with dense smoke without injury, as the filter would arrest the particles of carbon, of which smoke is composed, allowing only the air to pass into the lungs. A further use of the breath filter is to facilitate miners in exploring and working in mines where carbonic acid gas is present in noxious proportions.

A recent trial of filters, made substantially as suggested by Professor Tyndall, has lately taken place in England, and we will describe some of the results. The filter itself consists of a cylinder, four or five inches long and two inches or more in diameter. Its interior contains, at the top, a layer of cotton wool which has been moistened with glycerine, then a layer of dry cotton wool, then a layer of charcoal, then cotton wool, with wire gauze covers at both ends, and at the upper end a mouth piece so shaped as to fit closely over the mouth of the wearer. By drawing the breath through this instrument, the most dense smoke may be entered with impunity. This filter has been tested by the London Fire Department with such success that the firemen of that city are to be provided with it for regular use. When places are to be entered, such as mines or wells, where carbonic acid is present, it is necessary to add another layer of cotton wool, and to place a layer of slaked lime between the two bottom layers of cotton. The object of the lime is to arrest the carbonic acid and oxide gases.

A recent test consisted in placing the experimenter, who had one of the instruments secured over his mouth, within a small closet, with a rabbit and two birds for companions. Carbonic acid gas and carbonic oxide were then injected until the atmosphere of the closet was rendered highly poisonous. In twenty-three minutes, the animals were dead, but the experimenter came out at the end of thirty minutes, having suffered no inconvenience from the noxious gases; but the work of breathing through the small instrument for so long a period and the heat of so small an apartment rendered him uncomfortable. Experiments are still in progress to determine the best sizes and forms for the instrument, and ere long we may expect that the air filter will be an instrument of common use.

A WONDERFUL MACHINE.

The pin machine is one of the closest approaches that mechanics have made to the dexterity of the human hand. A small machine about the height and seize of a lady's sewing machine, only much stronger, stands before you. On the side, at the back, a light belt descends from a long shaft at the ceiling that drives all the machines, ranged in rows on the floor. On the left of our machine hangs, on a little peg, a small reel of wire, that has been straightened by running through a compound system of small rollers. The wire descends, and the end of it enters the machine. This is the food consumed by this snappish, voracious little dwarf. He pulls it in and bites it off by the inches incessantly—140 bites to the minute. Just as he seizes each bite, a saucy little hammer, with a concave face, hits the end of the wire three times, and "upsets" it to a head, while he grips it in a countersink hole with his teeth. With an outward thrust of his tongue he lays the pin sideways in a little groove across the rim of a small wheel that slowly revolves just under his nose. By the external pressure of a stationery hoop these pins roll in their places as they are carried under two series of small files, three in each. These files grow finer toward the end of the series. They lie at a straight inclination on the pins, and by a series of cams, levers and springs, are made to play like lightning. Thus the pins are dropped in a little shower in a box. Twenty-eight pounds is a day's work for one of these jerking little automatons. Two very intelligent machines reject every crooked pin, even the slightest irregularity of form being detected. Another automaton assorts half-a-dozen lengths in as many boxes, all at once, and unerringly, when a careless operator has mixed the contents of boxes from various machines. Lastly, a perfect genius of a machine hangs the pins by the head in an inclined platform through as many "slots" as there are pins in a row of paper. These "slots" converge into the exact space spanning the length of a row. Under them runs the strip of pin paper. A barb like part of the machine catches one pin from each of the slots as it falls, and by one movement stick them all through the corrugated ridges in the paper.

Electric Gas Lighting.—In order to insure as far as possible the safety of the gunpowder works at the Royal Arsenal, Woolwich, England, the gas-lamps are in future to be lighted by means of electricity. This process has already been adopted at the cannon cartridge factories, and several other workshops, where the quantity of explosive material is necessarily large, and it is understood to be intended to apply this system to all the buildings in the Royal Arsenal, where work of a similar nature is carried on. The whole of the lamps by which these workshops are lighted, are invariably fixed outside the windows, and open only on the outside of the building; but it has been thought that lighting them by the ordinary means is nevertheless attended with danger, and their ignition by wires in connection with a galvanic battery, will be the means of insuring greater security against accidents.

A communication has been made to the Philosophical Society of Manchester on the destruction of a church by lightning, in which clear particulars are given of the metallic connections, and of the behavior of the shock when it fell. The author states, in closing his paper, that in districts where gas mains, and water mains and pipes are laid underground, all buildings may be entirely protected by connecting the lightning conductors directly with the two sets of mains. Had this been done, he says, at the church in question, it would not have suffered.

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QUANTITY AND TENSION.

The term *quantity* has a well understood meaning; it conveys an analogous idea when applied to electricity, to that which it does when applied to water or to a gas; thus, two similarly charged Leyden jars, or two miles of submarine cable, contain twice the quantity that one does, and if the charges of both can be placed into one, the quantity remains unaltered, the only thing affected being the intensity or tension. If a pair of galvanic plates one inch square give a certain quantity of electricity in a unit of time, a pair of two square inches will produce twice the quantity, provided the plates are connected by very short and thick wire, for if connected by a very fine or long wire the quantity will be smaller, and if not connected at all none will be produced. In the latter case the quantity produced will be exactly that quantity which the connecting wire can convey from one to the other, and hence it arises that the quantity produced by a battery is generally proportional to the length and size of the connecting wire.

The effect exerted by electricity is in almost every case proportional to the *quantity* of electricity *in action*, and has no relation whatever to its intensity or tension.

On *quantity alone* depends the action of all telegraphic apparatus, which operates with more or less vigor according to the greater or less quantity of electricity passing through. If we increase intensity, we do so only with the view of making a larger quantity pass through the line, the quantity increasing in the same ratio that the intensity increases.

Electroscopic attraction and repulsion have not been hitherto considered by writers on electricity to be in any degree simply dependent on quantity, but to depend on the tension, or, as it is termed, the intensity of the charge; but a careful examination of the phenomena can scarcely fail to lead to the conclusion that the force varies *directly as the tension, directly as the quantity, and inversely as the distance.*

Intensity signifies difference or degree of tension, or that effect which is produced by increasing the number of cells in a battery; but in its more popular acceptation it has a very different value, and the effects of quantity are entirely confounded with those of intensity. Every condition and quality of electricity is expressible by the relations of quantity and tension, and they are equally applicable to all its states, whether static or dynamic. The earth is always referred to as the standard of tension.

The earth, however, does not always exhibit the same tension at all places. Nor does it always have the same tension at any given place. What are familiarly known to telegraphists as "earth currents" in their wires are evidences of this, and are produced by the flow of electricity between two points on the earth's surface, which are at the time in an unequal state of tension; the flow continues until the tension has equalized itself. During the prevalence of aurora these electrical compensations proceed incessantly, and sometimes rise to a magnificent scale. Vast floods of electricity flow through the earth and the ocean, chasing each other to and fro in the most capricious manner, the currents being sometimes so great as to fill the telegraph lines with currents as powerful as those yielded by a battery of 300 or 400 cells.

The mean tension of the earth, however, when free from these exceptional disturbances, may be taken as a standard of tension, its zero, like that of heat, being unattainable; we cannot determine the absolute tension of electricity, and, therefore, in speaking of the tension of objects, we mean their relative tension.

Wherever there are differences of tension and conductors there are currents of electricity set up, and these continue until the tension has equalized itself, and thus inequality of tension is the essential condition and cause of all electric currents. If we connect the negative pole of a battery of, say, 100 cells to earth, its positive pole instantly exhibits a tension of 100 elements plus, or above, that of the earth; if we reverse the battery, its negative pole presents a tension of 100 elements minus, or below, that of the earth.

If a battery of, say, 200 cells be perfectly insulated, it is impossible to predicate what may be the tension of either of its poles; all we know for certain is, that the tension of its positive pole is 200 elements above that of its negative, and that the tension regularly increases from cell to cell. If we touch any part of the battery with an earth wire, that part instantly acquires the same tension as the earth; thus, if touched at the centre, its poles are respectively 100 elements above and below that of the earth; if at 50 cells from the positive end, the poles respectively acquire tensions of 50 plus and 150 minus, and so on; all this time no current is flowing and the tensions are purely statical.

If one end of a long piece of wood or string be applied to the pole of a very powerful battery of, say, 500 cells, and the other end to the ground, the one end will have the same tension as the battery, the other will have that of the earth; and, if we apply an electrometer at successive points along the rod, we shall find every possible degree of tension exhibited from that of the battery to zero. This is an exact illustration of what takes place in a telegraph cable.

The amount of electricity which flows through a wire depends wholly on the relative tension of its two ends, and not on its absolute tension with respect to the earth. For example, a single cell of a battery connected by a wire transmits a given quantity of electricity when it is in its ordinary condition, and its tension therefore zero. If this element and its galvanometer be placed on the prime conductor of an electric machine, and the tension of the whole system be raised to two or three thousand elements above that of the earth, the quantity of electricity which passes is not affected, nor is the indication of the galvanometer. Again, if we connect a powerful battery with a very long wire, and place a galvanometer in circuit, first at the end near the battery, and afterwards at the end near the earth, or in any other part of the wire, we shall find its deflection precisely the same in all positions, although the tension at the extreme ends has been shown to be so different. We thus see that the indications of the galvanometer are not at all affected by the absolute tension of the point of the line at which it is connected.

If we form a galvanometer with only one turn of very thick wire, and note the deflection caused by one cell of moderate size, and then successively increase the number of cells, arranging them in series, we shall not, by so doing, find any increase whatever in the deflection of the needle, for the thick wire conveys freely all the electricity which one cell can produce, and the additional cells can only increase the tension, they cannot increase the quantity. If, on the other hand, a galvanometer be formed of a great number of turns of very fine wire, the deflection will be immensely greater with numerous cells. With a great length of fine wire the tension of one cell is only sufficient to transmit a small proportion of the quantity which it is capable of producing; by increasing the number of cells, however, the tension becomes sufficient to overcome the resistance; and whatever the length or fineness of the wire, there is some number of elements sufficiently great to cause as much electricity to pass in a unit of time as the one original plate caused to pass through the thick wire.

With dynamic electricity, the *quantity* of electricity which passes in a given time determines the amount of galvanic deflection, or electro-magnetic attraction, or chemical decomposition, or of the attraction of one current upon another, or of heat generated in a wire or a voltaic arc, and the *difference of tension* determines the velocity of electricity, or, in other words, the quantity which flows through a circuit in a given time. The tension, therefore, indirectly enhances all the phenomena above mentioned.

With static electricity the *quantity* of electricity on a given surface determines the amount of electroscopic attraction and repulsion, and it determines the degree of tension while the *tension* reciprocally determine the amount of attraction and repulsion, and also the quantity of electricity which will be stored up inductively on a given surface. And in all the above cases the degree of action varies in simple proportion to the quantities, or, in the case of repulsion, to the quantity and tension combined.

STATISTICS OF TELEGRAPHY.—At a recent meeting of the London Statistical Society a paper was read by Sir J. Anderson upon "The Statistics of Telegraphy." The paper embraced two subjects—first, the effect of reduced tariffs upon telegraphy, and, second, the merits of the various cables that have been invented. A table was exhibited showing that a private company, previous to the purchase by the Post-office of the land line, had reduced their tariff several times and made a profit of 7 per cent.; but it was shown in a second table that had the same company not reduced its tariff, it would have earned 17 per cent. Most of the arguments which Sir James Anderson adduced went to prove that a reduction of tariff led to a diminution of the net product. The kingdom of Belgium was cited as an example, it being stated that the most reliable statistics were obtained from this country. With regard to the *materiel* of the submarine cables, Sir J. Anderson said that he was strongly in favor of the old-fashioned and expensive manufactures. They were invariably more durable, and were found to be cheaper in the end, than the new and cheap cables. The report of the joint committee which was appointed by the Lords of the Committee of the Privy Council, eleven years ago, to investigate the matter, showed that in almost all cases small cables had been found liable to mishaps, while the heavier the cable had been, the greater had been its durability. Mr. Newall had said in his evidence that a hemp-covered cable which he had attempted to lay was destroyed in two years. It was stated in the paper that all cables which were manufactured and laid down upon the principles which were established in 1859 were at the present time in good working order, and every divergence from these principles had been at best a costly experiment or an utter failure. Sir James Anderson was of opinion—and the opinion was shared in by Captain Halpin—that it was advisable to multiply every precaution which should increase the strength of the cable, and to keep the strength intact as long as possible. Finally, he believed that the so-called economy would be at the expense of security, and that the cable of the future would be even heavier, more perfect, and more costly than the cable of the present day.

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FOREIGN TELEGRAPHIC ITEMS

POST OFFICE TELEGRAMS.—The total number of messages forwarded from Postal Telegraph stations in the United Kingdom during the week ending the 8th June, 1872, and during the corresponding week of 1871. Week ending 8th June, 1872, 286,687; week ending 10th June, 1871 (Ascot Race week), 222,490; increase in the week of 1872 on that of 1871, 64,197.

The statement showing the total number of messages forwarded from Postal Telegram stations in the United Kingdom during the week ending the 15th of June, 1872, and during the corresponding week of 1871, was: June 15, 1872, 298,957; June 19, 1871, 225,198; increase, 73,759.

THE TELEGRAPH TO AUSTRALIA.—Notice has just been issued by the Post-office that a telegraphic message of twenty words can be sent to Queensland, in Australia, for £10, and that it will be forwarded to Port Darwin by cable, and thence to its destination by horse express and telegraph. The whole distance which such a message will travel will be some 14,000 miles, and it will reach its destination in about thirty hours. It will go from London to the land's end on land wires, and will enter the sea and reappear at Alexandria, pass over Egypt, re-enter the sea at Suez, and again appear at Port Darwin.

With respect to the alternative line from Port Darwin to Adelaide, projected in the report of the British Australian Telegraph Company, it is well to know that the Queensland Government have asked the Legislature for authority to guarantee interest on the cost of a second cable from Batavia to Queensland. Resolutions to that effect were moved last April in the Legislative Assembly by the Prime Minister, Mr. Palmer, and were favorably received. Those resolutions, and the Act of Parliament carrying them out, have, it is assumed, by this time been passed. As all the telegraph lines in the Australian colonies are State lines, the Queensland Government will naturally divert all the messages upon the guaranteed line, in order to cover its guarantee, and any branch line from Port Darwin to Queensland, such as is proposed by the British Australian Company, could, therefore, it is contended, only command even a portion of the business flowing from Europe to Queensland and the eastern colonies, and none of that flowing from the latter to Europe. The former business would be quite inadequate to prove remunerative, and the necessity for this extension has been altogether superseded by the action of the Queensland Government. Unless that decision be reversed, of which there seems no likelihood, the Queensland Government would not allow the branch cable to land, as it would carry off some of the business, and would render it more likely that the Government would have to pay some portion of the guaranteed interest. Meantime the British Australian Company's line across the continent approaches completion, and so narrow is the gap that the company is now prepared to send messages from the north to the south of the island. Since writing the the above we have been informed that the directors have received notice that their cable between Java and Port Darwin is interrupted, and advice that messages for Australia, New Zealand, and Tasmania should for the present be sent by post, *via* Galle.

THE TELEGRAPH IN NEW ZEALAND.—Telegraphic communication is at last completed from end to end of the islands, by the extension of the line to Auckland. Speaking of this important and long delayed work, one of the leading journals of the colony justly remarks: "The completion of the telegraph to Auckland is a subject for no ordinary congratulation. All the important towns and settlements in the colony now enjoy the advantages of instant communication with each other. For years the work of connecting Auckland with the rest of the colony has been embarrassed by obstacles of vexacious and not easily surmountable character. The difficulties have arisen from the fact that the wire had to pass for a considerable distance through the lands of natives jealous in the extreme of European influence, and fanatically opposed to anything calculated to infringe their exclusiveness. But by continuous diplomatic persuasion, and a happy mixture of pressure and conciliation, the prejudices of the natives have been overcome, and now the talking wire has broken down another of the barriers to the progress of civilization in native regions."

CONTINENTAL RATES.—It is understood that the Submarine Telegraph Company have for some time past contemplated making a large reduction in their tariff to the Continent, and that with this object negotiations are in progress with the French Government (subject to the approval of Her Majesty's Postmaster-General) for a mutual reduction of rates, which, if carried into effect, will establish a uniform charge between all telegraph stations in France and in Great Britain; besides which, they hope to effect a considerable reduction in the through rates to Italy, Spain and the South of Europe. As the diminution in the charge of telegraph messages has hitherto invariably produced a large increase of business, it may be anticipated that, in adopting these liberal measures, the Submarine Company will add to their own revenue, while, at the same time, they will confer a great boon on the public, and more especially on the mercantile community.—*London Railway News.*

TELEGRAPH ACROSS THE ANDES.—According to the last advices from Buenos Ayres, the Trans-Andine Telegraph was expected to be completed in a few days, so as to establish immediate communication between the Southern Pacific States and the Atlantic. The impetus thus likely to be given to the progress of Chili, Bolivia, Peru, and the Argentine Republic can hardly be overestimated. In other directions similar work is actively going on. "The Bolivian Government," says the Buenos Ayres *Standard*, "is laying down wires to meet ours at Jujuy, and the Paraguayan has notified President Sarmeinto that its main line will soon touch the Argentine at Paso la Patria." At the same time connection with the Uruguayan Republic from a line from the Argentine province of Entre Rios will speedily be in operation, and meanwhile, with regard to the working of the communications at present opened, it is said "the low tariff fixed by Government has led to such an enormous growth of business in the interior that two wires are wholly insufficient, and five more are necessary." The clerks in the various offices, it is added, work fourteen hours daily, and yet, although the staff in some places has been trebled, can scarcely clear of the accumulation of messages.

CABLE EARNINGS.—The companies owning and operating lines of trans-Atlantic telegraph have certainly no good reason to complain that their property is not profitable. At the recent annual meeting of the Societe du Cable Trans-Atlantique Francais, it was announced that the balance of profits due the shareholders upon the earnings of 1871 was £189,836, or a dividend of 12 per cent., besides leaving £24,295 to be added to the reserve fund. It will be remembered that the French company endeavored, when their line was projected, to secure assistance in laying it from the Anglo-American company, which was at first refused. Subsequently, however, an arrangement was completed, according to which the Anglo-American company was to receive 52 per cent. of the receipts and the French company 48 per cent. It is out of this share that the 12 per cent. dividend to stockholders has been declared. At the recent annual meeting of the Telegraph Construction Company the accounts showed a devisible profit which, with the division previously made, gave the shareholders for 1871 25 per cent.

THE Eastern nations of Europe are waking up on the subject of submarine telegraphy. It is announced that the Czar of Russia and the Sultan of Turkey have come to the conclusion of establishing telegraphic communication between Odessa and Constantinople, by means of a cable underneath the waters of the Black Sea. The starting point of the cable will be on the European shore of the Black Sea, at the mouth of the Bosphorus. The work will be finished within a year.

DR. JOULE, in some experiments lately made on the polarization, by frictional electricity, of platinum plates, has found that charge which they received was only diminished one-half after an interval of an hour and a quarter. The plates were either immersed in water or were laid in alternate series, separated by wet silk. The amount of charge they took was measured by means of a delicate galvanometer. He has suggested that a condenser on this principal might be useful in researches on atmospheric electricity.

OBITUARY.

SAMUEL C. BISHOP.

It is with no ordinary feeling of sorrow that we announce the death of Samuel C. Bishop, late proprietor of the Bishop Gutta Percha Works, who died in this city on the evening of the 4th of July last. Mr. Bishop has for many years been well known to the telegraphic fraternity as the manufacturer of submarine telegraph cables and insulated wires, for electrical and telegraphic purposes.

He was in ordinary health up to within a few days of his death, when he was somewhat prostrated by the excessive heat, and remained at home as a precautionary measure, but was not considered seriously indisposed until the day of his decease. His remains were taken to Boston, Mass., and now rest in the beautiful cemetery of Mount Auburn, where they were deposited on Tuesday last. He leaves a wife, but no children, to mourn his death.

BORN.

AYRES—June 24, 1872, to H. S. Ayres, chief operator West Penn. R. R., Blairsville, Pa., a daughter.

MOSES.—June 29, 1872, to J. N. Moses, Manager W. U. Telegraph Office, Laramie City, Wy., a son.

MARRIED.

BEELER—WEST.—At Brookfield, Mo., May 29, 1872, by Rev. W. S. Cooper, T. S. Beeler, Train Dispacher H. & St. J. R. R., to Miss Carrie R. West, of Brookfield.

BELL—POOR.—At Reno, Nev., on Tuesday, July 2, 1872, Frank Bell, Manager W. U. Telegraph Office, Reno, to Mary P. Poor, of same place.

MOORE—RILEY.—In Industry, Pa., July 9th, 1872, by Rev. W. L. Wortman, Jno. E. Moore, East Liverpool, Ohio, to Miss Mattie E. Riley, formerly Operator at Industry, Pa.

STEWART—DIEL.—At Sedalia, Mo., June 20, 1872, by Rev. J. Brown, A. M. Stewart, Operator W. U. Telegraph Office, Pleasant Valley, O., to Miss Lizzie Diel, of Sedalia. No Cards.

DIED.

LOGAN.—In Birmingham, Mich., June 19, 1872, of consumption, Mary E., wife of William J. Logan, aged 25 years and 5 months.

MILER.—At Williamsburgh, L. I., July 6, 1872, Willie Vincent, infant son of Thomas M. and Anna Miler, aged 4 months and 26 days.

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CORRESPONDENCE.

FOLLOWING COPY.

SAVANNAH, Ga., July 1, 1872.

To the Editor of the Journal of the Telegraph:

The position which "Buffalo" has assumed appears to be somewhat indefinite in its intent. It might be inferred that he means, that if an employee of the company is absolutely certain that the message is wrong, he ought to be permitted to exercise his judgment in correcting it, in order to prevent reproach or injury to the company by delaying the message for subsequent correction or delivery, is palpably erroneous. But, as no operator absolutely knows a message which has been sent to him for transmission to be wrong, it would appear that "Buffalo" believes in abiding by the company's regulations, verbatim, rather than permit him to exercise his opinion as to its correctness.

The point he has in view may, however, be this: ought an operator, under any circumstances, be permitted to exercise his judgment in matters appertaining to the interests of the company employing him? This question is a very nice one, and its discussion would no doubt prove very interesting in its various aspects. People's judgment are so variable, their views of questions so different, that what might appear just and reasonable on the part of one, would appear diametrically opposite to the next; so that one operator's judgment might be condemned by another, both objected to by the company, and a suit for damages against the latter by the party sending the message, demonstrate that he agreed with none of them. An operator sending a message might conscientiously believe, and after serious deliberation, become convinced that there was an error in the message, but by assuming the responsibility of an alteration entail considerable annoyance, complication and loss to the party sending the message, who had originally arranged it according to his idea of the requirements of the case.

Cipher messages are in such general use and of such peculiar and varied character that it is often difficult to determine whether a telegram is intended to be construed literally or arbitrarily. It is not remarkable to observe even more peculiar words than "Skiagow," or "Calt" in a telegram, and they may mean Chicago and Salt, or something entirely different; and it appears more reasonable to allow the message to go forward as written, than attempt an alteration which your judgment may deem necessary, when your judgment has no better foundation than appearances.

The relations of a telegraph company with the public are simply that of agents, and the operators hold similar relations towards the company, but not towards the public. The company prescribe certain rules and regulations for the maintenance of their relations with the public, which the latter subscribe to when they send a telegram. The company establish other regulations for the government of an agent which that latter is presumed to agree to upon entering into their service, and also to abide by any other rules so long as he remains in their employ. The company hold the right to remove him for a violation of their rules, and he holds the right to leave their service if these rules are objectionable to his views. The company have no right to question the nature of a telegram which they have accepted for a stipulated consideration, and such being the case, it is hardly reasonable that its agent has a right to exercise his judgment, especially when neither judgment nor common sense is available, since he is necessarily ignorant of the intent and purpose of the sender. It appears to be simply the business of the receiving clerk to understand the *words* contained in a message, irrespective of their apparent sense or signification; the business of the company to forward and deliver such message exactly as the original receiving clerk understands them. There their responsibility ends. If the company are inclined to exhibit a spirit of accommodation towards a customer by having a message repeated, or if the agents of the company have this done in order to satisfy themselves that it has been correctly transmitted, and thus protect the company's business, it appears that operators ought not to question the sense of it, since they are simply employed to work so many hours a day, and the expediency of the matter is immaterial since it does not affect their interests, if the lines are blockaded with messages, to protect the interests of the company. If an operator transmits a message incorrectly, it is caused by carelessness, incompetency, or something else, which the company holds him responsible for; and if he would be willing to accept the same responsibility for the results of his judgment, I see no reason why the company should not accept it, providing they are properly secured. But it is of very questionable utility for a telegraph company to permit any violation of rules which have been adopted under the influences of long experience, and have been so far found to be fully adequate for the purposes intended—namely, the protection of the interests of the company.

SAVANNAH.

OBTAINING FULL DIRECTIONS.

MASSACHUSETTS, June 28, 1872.

To the Editor of the Journal of the Telegraph:

As I have never observed anything in the JOURNAL in regard to this matter, I merely wish to make an enquiry in relation to obtaining full directions from customers, where, and how to deliver their messages.

For instance, A, of Winchester, wishes to communicate the news of a death to B, of Greenfield. After the usual method, he simply directs to "B," Greenfield.

After some delay the operator at Greenfield, ascertains that B lives a mile away. What is to be done. "Oh, very likely, B would be willing to pay any reasonable sum for the delivery of that message," I hear some one say. Perhaps this "B" would be willing, but is every "B" willing?

Out here in the country it is not unusual to receive messages in this way, to be delivered one to three miles away from office, no delivery guaranteed or knowledge of location of "B" connected to the message. Would it not be judicious, at least, for every receiving clerk to obtain full directions about *delivery* of every message? and if "B" lives outside of free delivery, to ask "A" to deposit a sum sufficient to defray the expense of delivery of his message?

CONSTANT READER.

Answer.—Not only would it be judicious, but it is the actual duty of every receiving clerk to require full directions to be upon a message before he accepts it. Also, if the party resides beyond the limit of free delivery, to require that the cost of delivery should be pre-paid, or a sufficient guarantee be given.

TEXAS, June 19, 1872.

To the Editor of the Journal of the Telegraph:

If a receiver at counter cannot change the spelling or wording of a message, please tell us what to do in these cases!

"Send me by express one caike 5 pen neals."

This was handed in by a small white boy, who brought it from his father, living ten miles in the country—said boy could neither read nor write. He wants *one keg five-penny nails.*)

Again:

"Sent emeadtly 2 bunch larch Bannanas, 3 barl. sound Ables."

This handed in by an ignorant colored man, who brought it from a German grocer, away down town.

NOEL.

Answer.—In these cases the chief requisite is common sense. If the receiver *knew* the correct rendering of these messages he should have given it.

NEW CHICAGO, Ks., June 29, 1872.

To the Editor of the Journal of the Telegraph:

I received a message from Indianapolis which requests me to get answer to the same, and send to Kansas City. Now, have I to be responsible for the answer I send? that is if not collected there; or should that message have been pre-paid at Indianapolis?

J. G. MEYERHOEFER, Manager.

Answer.—Indianapolis office is responsible.

To the Editor of the Journal of the Telegraph:

By answering the following, you will oblige.

Are not all railroad operators, who have charge of the business of the W. U. Tel. Co. at their offices, entitled to ten per cent. of the receipts for that Company.

Answer.—The amount to which such operators are entitled, depends entirely upon the agreement made with the Superintendent, when such charge was taken.

ANSWERS TO CORRESPONDENTS.

THERE are eleven words in the following message: "Be down by freight train to-night. Look out to admit us."

JAMES H. WALKER is informed that the "Duplex" system is available only between terminal stations. As yet the principle has been developed only so far as to transmit but *two* messages at the same time.

There is evidently some error regarding the "appointment" matter of which he writes.

THE porous cups in the ordinary blue vitriol battery, if not broken or covered with a deposit of copper, are good for use for any length of time. They should be washed occasionally in water.

The crystalized vitriol which collects on the outside of the jar, as well as that which remains undissolved in the bottom of the jar, is good for use, and should never be thrown away.

The old coppers should be preserved when replaced by new ones, and should be forwarded to the supply office.

To the Editor of the Journal of the Telegraph:

Would you be kind enough to grant me space in your valuable journal to make a suggestion to those whom it may interest. Some time ago my application to become a member of the "Telegraph Life Insurance Association" was rejected on account of physical disability. There are many operators who cannot become members of this Association for the same reason, who have families that would be left quite as destitute, in case they were deprived of their support by death, as the families of the more vigorous and healthful. Such operators, I would ask, if it is not our duty to make provision for our families and those who are dependant upon us for support?

OPERATOR

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, JULY 15, 1872.

POSTAL TELEGRAPH.

On the 16th of May last, a lengthy debate took place in the United States Senate upon the bill reported by Mr. Ramsay, Chairman of the Senate Committee on Post Offices and Post Roads, known as the "Hubbard" scheme. In commenting upon this debate, we hope to present some facts which may serve to enlighten certain Senators, who, no doubt honestly, yet without a full knowledge of the subject, supported the measure. Prominent among these was the Senator from Maine, Mr. Hamlin, and it is with a portion of his remarks that we take issue, and we trust, that when the truth is plainly shown that the gentlemen we refer to will find reason to change their views, and that henceforth they will be found where both their public and private character would seem to place them, on the side of justice and right.

It appears from the statements of the Senators who participated in the debate, that the consideration of this scheme was brought up at a time when there were but few Senators present and the majority of these were advocates of this specious job. Whether this was a preconcerted trick to pass the bill in the absence of those who have more regard for the rights of private citizens and private property, than they have for the advancement of lobbyists' schemes, and the wholesale spoliation of a vast private estate, for the benefit of a pack of greedy knaves, under the specious, but dishonest, plea of cheapening the rates of telegraphing, we are unable to say, but we are compelled to admit that appearances strongly favor that conclusion.

Some of the Senators, undoubtedly, clearly understood the whole job, and no doubt know into whose pockets the million dollars provided in the bill for merely organizing Hubbard's scheme would go. But there are other Senators who seem to favor this job without understanding what is involved in it, and are thus unwittingly aiding in the consummation of a great swindle on the public and the telegraph companies. Thus, Senator Hamlin, who, to his credit, voted for the appropriation to enable Professor Morse to establish the first line of telegraph between Baltimore and Washington, advocates the "Hubbard" job, under an apparent misconception throughout.

Mr. Hamlin stated in the course of his remarks that, the simple question, in his judgment, was whether it is not wise at this day and this time for our Government to do what almost every other government has done, "take this system of telegraphing operations into its own charge."

Now, as no other government in the world has ever adopted a scheme like this of Hubbard's, and has never sought to seize or control the telegraph, except by honorable purchase, it is evident that Mr. Hamlin does not understand the scheme which he advocates.

There are many other statements contained in Mr. Hamlin's remarks which show that he has not studied the subject upon which he has spoken, and that the statements made to him upon this subject by interested parties are very far from true.

Thus, he says, "When you turn to the European governments, where this system has been taken charge of by govenment, I think we are able to state, in every case successfully, they have reduced rates vastly below anything we have had in this country. In Belgium, for the transmission of ten words, ten cents are charged. In France, from ten to twenty cents. In Great Britain, twenty-five cents. In Canada, twenty-five cents."

Now, in answer to the above, it is a fact that the government telegraphs in Europe have never paid their expenses for a single year since they were established. During the year 1870, the last year for which official returns have been received of the operation of the telegraphs in Europe, the expenses for the operation of the telegraphs exceeded the receipts by over five millions of dollars, and the expenses have exceeded the receipts in Europe, for every year since 1868, by upward of two million dollars per annum.

In regard to the rates, Mr. Hamlin has also been led into error. In Belgium, internal messages, not exceeding twenty words, including address and signature, are sent without guarantee of promptness or accuracy, for ten cents, but upon transit and international messages, twenty cents is the lowest charge. The international messages are those which are sent to other countries, or received from other countries. In either case only one-half of the service is performed by Belgium, that is to say, if an international message is sent from Belgium, the expense of receiving and delivering is not borne by the Belgian administration, nor the expense of transmission of such messages when received in Belgium.

The transit messages are neither sent nor received in Belgium, but are simply shot across the Belgian territory, as a message going from New York to Washington, would be shot through the State of New Jersey; and yet, upon this class of messages, in the transmission and delivering of which the Belgian administration performs no service whatever, they charge double the tariff that they do for their internal messages upon which they perform full service.

In 1870, Belgium transmitted and delivered 1,343,118 internal messages, for which she received 744,641 francs, or a little over eleven cents each. During the same year she transmitted 248,961 and received 258,485 international messages, and 147,848 transit messages, making a total of 655,294 international and transit messages, for which she received 810,048 francs, or about twenty-five cents each. The expense of performing the service was $305,730. The whole number of messages for 1870, counting the internal, both sent and received, and the transit messages, which were neither sent nor received in Belgium, but were simply shot across her territory, amount to 1,998,412, and if these had all been charged at the average internal rate of eleven cents each, the receipts would have amounted to $219,825, or $85,905 less than the expenses.

In France, the telegraph arrangement is very similar to that in Belgium. They have a cheap rate for certain classes of internal messages, and make up their deficiency to a certain extent by a larger tax upon international correspondence. Owing to the disturbed condition of France, resulting from the war with Germany, no report of the working of the telegraph for 1870 has been published. In 1869, the total number of messages sent in France was 4,754,643. The receipts were $1,967,902, and the expenses $2,585,799. The average tolls received upon internal messages was twenty-seven and one-half cents. The average tolls received upon international messages was one dollar and twenty-six cents. Messages of twenty words, including address and signature, may be transmitted from one part of France to another for twenty cents, and between any two stations, situated in the same department, for ten cents. Thus it is possible to transmit messages between the most extreme points in France, a distance of 600 miles, for twenty cents, but a dispatch going from Paris to Brussels, or from Paris to London, costs eighty cents.

But supposing it were true that messages were sent in France for twenty cents, it does not prove anything in favor of governmental telegraphy, since those rates are not self-sustaining, even in that country of cheap labor, but result in a large annual deficit.

In Canada the lines are not under government control, and never have been, and therefore there is no propriety in bringing the telegraph in that country forward as an example in support of any government or semi-government scheme.

Another reason given by Mr. Hamlin, why our Government should take charge of the telegraphic system, is that it operates to diminish the revenue of the Post Office. To show how little weight this view of the case is entitled to receive, it is only necessary to say that if the Government received three cents postage upon each of the ten million of telegrams, annually transmitted in this country, the gross revenue would only be increased $300,000, an

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insignificant sum out of a total expenditure for the Post Office Department of $25,000,000 per annum. But how the adoption of the "Hubbard" scheme is going to prevent a diminution of the revenues of the Post Office does not appear. By the provisions of the proposed bill, messages are to be deliverd at the expense of the Post Office Department within a mile of every telegraph office. There are now in the United States over six thousand telegraph offices. If the number is not reduced after the "Hubbard" scheme has gone into operation, the Post Office Department will be required to furnish at least one man to deliver messages at each of these offices, while at many of the larger offices a very large force would be required. At New York, for example, it would require at least one hundred and fifty men, for this purpose alone. Supposing, however, that only one man was employed at each of the six thousand offices, at a salary of one dollar per day each, there would be an annual expenditure for this purpose alone of over two million dollars.

For performing this service, besides furnishing office room, stationery, printing, stamps, receiving the messages from customers over the counter, taking charge of, and accounting for the money, furnishing reports and supervising the business generally, the Post Office Department, under this bill, is to receive five cents per message; and if 10,000,000 messages were sent per annum, the total revenue accruing to the Post Office Department, from this source, would amount to just half a million dollars, while the expense of delivering alone would be more than two and a half millions of dollars.

Another reason which Mr. Hamlin adduces why he advocates the "Hubbard" job, is, that the Western Union Company has abrogated the arrangement under which it transmitted Weather Reports for the Signal Office for which, he says he believes, about $250,000 have been paid annually. Now, in the first place, there is no provision in the "Hubbard" bill for the transmission of these Weather Reports at any price. In the second place, the Western Union Company has never refused to transmit them, promptly and accurately, and at a price to be fixed by the Postmaster-General. In the third place, the Western Union Company has never received $250,000 for sending these reports annually, nor has it received one-quarter of that sum of money for transmitting these Weather Reports during the past two years. According to the terms of the agreement, the Signal Office should have paid this Company about $65,000 for transmitting the Weather Reports last year, but they have, thus far, paid only about one-half of the latter sum.

If Mr. Hamlin has been informed by the Signal Office, that they paid this Company $250,000 for transmitting their reports, we suggest that it would be a very proper subject of investigation, with a view of ascertaining what has become of this large sum of money.

It is always a very safe and popular thing to pitch into corporations upon every and all occasions, and the Western Union Telegraph Company cannot expect to escape the shafts of slander which are thrown from envy, self-interest, or any of the other meaner motives which actuate some portions of mankind. The simple truth, however, is, that the Western Union Company has, within the past six years, doubled the extent of its lines and wires; more than doubled the number of its offices, employés, and the number of messages annually transmitted, while it has reduced its tariffs over fifty per cent. With a property thus increased in value and with a business so largely augmented, its net revenue for 1871 was less than in 1866. During the past six years it has only declared three annual dividends, of four per cent. each, and the remainder of its income, together with all of its vast energies, have been devoted to the public good. It is all very well talking about cheapening telegraphing for the people at the expense of somebody else, but when any government, company, or individual, can be named which has done as much toward furnishing cheap telegraphic facilities as the Western Union Company has done, we shall be ready to listen with more patience to their theories.

If Mr. Hamlin thinks that the Western Union Telegraph Company, and the other telegraph companies, of the United States, are not furnishing such facilities as the public require, and at such prices as are fair and equitable, and that the Government can do the business more satisfactorily, then we can conceive that he may regard it as his duty to advocate the establishment of a government-telegraph.

In such a case the Government should buy the lines and work them as best it may for the public good. Contracts already exist between the Government and the telegraph companies, by which the telegraph companies are compelled to sell their lines to the Government whenever the Government elects to take them, at a price to be fixed by five impartial arbitrators, two of which are to be named by the Government, two by the telegraph companies, and the fifth by the other four. With such an easy, simple and just method as this for the Government to acquire the telegraph property of the country at its value, what reason is there for the Government of the United States to negotiate for a partnership arrangement for the establishment of a competitive telegraph system with a professional lobbyist, who has never owned a rod of telegraph line; never had any telegraphic experience, and, to any considerable extent, has never even patronized the telegraph?

JULY 1, 1872, the Western Union Telegraph Company owned:

Miles of Poles	60,668
Miles of Wire	134,395
Number of Offices	4,887
The total number of persons in its service at that date	7,321
The total number of messages transmitted in 1871, was	11,404,653

THE attention of Managers of Offices is directed to the list of towns and villages on Staten Island, given in the Tariff Circular, with the rates of delivery to each, from the Quarantine office. Only recently a customer, in offering a message for New Brighton, Staten Island, at one of our large Western offices, was compelled to leave without sending it, owing to the ignorance of the receiving clerk, who did not conceive it to be within the line of his duty to enquire of New York, (with whom his office was in direct communication), the rates of delivery. Five minutes of time, intelligently applied, would have secured the business to the company, satisfaction to the customer and a little useful knowledge to himself.

IN this issue Buell advertises a new Key to match his "Little Monitor" Sounders.

THE millenium has not yet arrived. This is evident from the fact that in an existence of one short month, the corporation of which Mr. G. B. Hicks is the head, has discovered pirates dealing out spurious wares in their name. See our advertising columns.

THE ARTISAN comes to our table in an enlarged and attractive form. It is pleasing to note these evidences of success. Every advancement of this character indicates a growth of scientific knowledge in the country of which such journals are acknowledged exponents.

NEW YORK, NEWFOUNDLAND AND LONDON TELEGRAPH COMPANY.

AT a late meeting of the Governing Committee of the New York Stock Exchange, a report was received and adopted from the Committee on Stock List, by which the stock of the New York, Newfoundland and London Telegraph Company was ordered to be placed on the free list of stocks at the Exchange. The following is the official statement of the corporation in question:

The official statement of the New York, Newfoundland and London Telegraph Company, incorporated by the Legislature of Newfoundland by Act of April 15, 1854;

Capital stock authorised by act April 15, 1854	$3,000,000
Capital stock authorised by act April 26, 1867	3,000,000
Total	$6,000,000
Of which there as been issued, and the proceeds expended in construction and maintenance of the company's lines, 38,382 shares, of $100 each	3,838,200
Increase of stock, all subscribed for, and issued June 1, 1872	480,000
Total	$4,318,200
Bonded Debt—Five per cent. Bonds, mature June 1, 1874, interest guaranteed by Newfoundland Government	85,000
Total	$4,403,200

No floating debt. Surplus, $81,746. Net earnings for year ending Feb. 1, 1872, in gold, $412,207. Dividends declared from Aug. 1, 1867, to date, average ten per cent. per annum.

Officers—President, Peter Cooper; Vice-President, Cyrus W. Field; Treasurer, Moses Taylor; Secretary, E. T. Hatfield; Superintendent, H. H. Ward.

Directors—Peter Cooper, Moses Taylor, Cyrus W. Field, Marshall O. Roberts, Wilson G. Hunt.

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THE SERVICE.

WESTERN UNION TELEGRAPH CO.

MAY, 1872.

Appointments.

Miss K. Belknap.....Operator.....Cooper Union, New York
W. A. Brower..... " .....413 Broadway, "
R. J. Callahan..... (Relief) .....Everett House, "
J. D. Congdon.....Operator.....145 Broadway, "
— Cottrell..... " ..... " "
Miss G. E. Cooper..... " .....City Dep't, "
J. Corcoran..... " .....145 Broadway, "
Miss S. A. Dresser..... " .....City Dep't, "
W. H. Egan..... " .....349 Broadway, "
Miss L. C. Ellsworth... " .....City Dep't, "
G. Farrell..... " .....News Room, "
F. G. P. Griffith..... " .....241 Broadway, "
J. D. Haines..... " ..Grand Central Hotel, "
A. J. Hatch..... " ..Broadway & 34th st., "
O. Jenks..... " .....145 Broadway, "
Miss S. Johnson..... " .....349 Broadway, "
Miss K. L. Johnson.... " .....City Dep't, "
J. Kenned ..... " .....News Room, "
Miss H. A. A. Kuhler... " .....City Dep't, "
W. H. Lyons..... " .....145 Broadway, "
W. McCullum..... " ...Metropolitan Hotel, "
J. E. Morawski..... " ... .Castle Carden, "
A. W. Pearkes. ..... " .....145 Broadway, "
Mrs. M. G. Phillips.... " .....Quarantine, S. I.
C. T. Raymond..... " .....145 Broadway, New York
E. F. Richardson..... " .....Sweeny's Hotel, "
J. F. Shain ..... " .....145 Broadway, New York
H. D. Shultis..... " ..... "
K. Smith..... " ..... "
C. H. Thomas..... " ..... "
P. J. Tiernay..... " ..... "
L. E. Weller..... " ...Board of Brokers, New York
Miss P. A. Williams.... " 55th St. Cable House, "
J. Sutherland..... " .....Aulac, N. B
D. Bailley..... " .....Halifax, N. S.
F. A. Taylor..... " .....Point du Chene, N. B.
H. W. Barney..... " .....Cuttingsville, Vt.
C. S. Moors..... " .....Marlboro Depot, N. H.
E. J. Blood..... " .....Nashua, N. H.
L. C. Blake..... " .....Tilton, N. H.
Sturtevant Brothers...Managers.....Woodstock, Vt.
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F. L. Crane..... " .....Dalton, Mass.
C. Leonhard..... " .....East Hampton, Mass.
Miss E. M. Kite..... " .....East Hartford, Conn.
Miss L. Follansbee..... " .....Mansfield, Mass.
J. C. Robinson..... " .....Newport, R. I.
C. E. Lincoln..... " ..... "
J. M. Whitcomb..... " .....South Weymouth, Mass
E. Miller..... " .....Stamford, Conn.
G. S. Clarke..... " .....Stepney, Conn.
G. D. Soule..... " .....South Abington, Mass.
W. F. Branch..... " .....Webster, Mass.
J. Hoogs..... " .....Boston, Mass.
Mrs. M. A. Pope..... " ...Ladies' Dep't, Boston, Mass.
C. H. Ormsbie..... " ...Revere House, Boston, Mass.
Henry Mack..... " .....Albany, N. Y.
S. J. Herschberger..... " Albany (Delavan House), N. Y.
Miss J. Burnett..... " .....Carmansville, N. Y.
G. A. House..... " .....Cohoes, N. Y.
Miss J. Pierson..... " .....Fort Washington, N. Y.
N. T. Chase..... " .....Montrose, N. Y.
G. C. Helling..... " .....Petersburgh, N. Y.
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F. Gould..... " .....Schenectady, N. Y.
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H. Rawlins..... " ....Laurel, Del.
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M. W. Tingley..... " ..... "
S. A. Boyle..... " ..... "
— Gi Ar..... " .....Shenandoah, Pa.
H. M. Steever..... Operator.....Spring Brook, Pa
A. Watson..... " .....Wyoming, Del
F. R. Moody..... " ..... Wilmington, Del.
W. B. Ogden..... " .....Washington, D. C.
E. T. Ward..... " ..... "
E. B. Thompson..... " .....Owego, N. Y.
C. F. Skinner..... " ..... "

Transfers.

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G. E. Cromwell	145 Broadway, N. Y.	Cotton Exchange, N. Y.
E. Faton	Quarantine, S. I.	Corn Exchange, N. Y.
H. W. Gilbert	Beaver & William, N.Y.	Cotton Exchange, N.Y.
C. H. Jennings	" "	" N.Y.
MANAGER.		
E. N. Johnson	" "	" N.Y.
OPERATORS.		
Miss N. G. Lowell	117 Worth St., N. Y.	413 Broadway, N. Y.
J. J. O'Connor.	145 Broadway, N. Y.	Stewarts, N. Y.
W. Redfield	Board of Brokers, N.Y.	Station H., N. Y.
Miss M. S. Rockfellow	City Deparment, N.Y.	Flushing, L. I.
L. L. Welp	Stewarts, N.Y.	G.C.&N.Y.Hotels, N.Y.
J. F. Wardell	Darien, Conn	Norwalk, Conn.
G. M. Chapin	East Hampton, Mass.	Simsbury, "
W. Cameron.	Mansfield.	" Worcester, Mass.
J. Corcoran, Jr.	Norwalk, Conn	New York, N. Y.
J. F. Cleverdon	Stamford "	Boston, Mass.
H. N. Williams, Jr.	New Bedford, Mass.	"
Miss L. Follensbee.	Webster, Mass.	Mansfield, Mass.
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Miss L. A. Haine	Ft. Washington, N. Y.	Irvington, N. Y.
Miss J. L. Walton.	Irvington, N. Y.	New York, "
J. E. Tallman	Montrose, N. Y.	D. & C. Junc, "
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G. S. Brendel	B'ch Office, Balt., Md.	M'n Office Balto., Md.
W. H. Boggs.	"	"
W. L. Ruth	Clearefield, Pa	Osceola, Pa.
J. Taylor	Communipaw, N. J.	Philad., "
E. J. Hirschberg	Easton, Pa.	Mauch Chunk, "
— Seitzenstatter	Newark, N. J.	B'ch Off. Newark, N. J.
W. H. Clark	Northumberland, Pa.	Sunbury, Pa.
W. O. Eastlake	Wilmington. Del.	Philad., "

Resignations, &c.

Miss E. L. Catterfield..Operator...City Department, New York.
L. S. Eddy. ..... " .Duane St. & B'way, "
W. H. Egan..... " .....349 Broadway, "
Miss L. C. Ellsworth .. " ...City Department, "
G. C. Genet..... " .....Chambers St., "
Miss C. A. Gerry..... " ...City Department, "
J. Horn, Jr. .....Manager..Board of Brokers, "
Miss N. Hunt .....Operator...City Department, "
M. J. Landy..... " .....145 Broadway, "
Miss P. A. Lewis..... " ...City Department, "
W. McGibney..... " Grand Central Hotel, "
Miss S. F. Moore..... " ...City Department, "
Miss M. C. Salisbury .. " ..Broadway & 43 St., "
F. M. Shefers..... " .....145 Broadway, "
C. S. H. Small.....Chief Op'r.....145 Broadway, "
W. Walsh.....OperatorGrand Central Hotel, "
Miss I. H. White.....Operator...City Department. "
W. B. Clum..... " .....145 Broadway, "
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C. P. Russell..... " .....Cuttingsville, Vt.
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R. S. Perkins..... " .....Tilton, N. H.
L. Pratt..... " ..... Woodstock, Vt.
Geo. H. Barbour..... " .....Collinsville, Conn.
O. P. Hayes..... " .....Dalton, Mass.
Miss A. McInerney.... " .....E. Hartford, Conn.
Miss E. J. McRoy..... " .....Simsbury, Conn.
C. H. Platt..... " ....Stepney, "
R. W. Cook..... " .....South Abington, Mass.
G. F. Stewart..... " .....Boston, Mass.
G. S. Perley..... " ....Revere House, "
A. Leroy..... " .....Cohoes, N. Y.
W. R. Morey..... " .....Oxford, N. Y.
J. F. Ague..... " .....Rochester, N. Y.
T. H. Allen..... " .....Utica, N. Y.
R. T. Dougherty ..... " .....Delanco, N. J.
J. W. Holton..... " ..... Baltimore, Md.
J. H. Pippitt..... " .....Hazleton, Pa.
F. M. Dayton..... " ..... Orange, N. J.
J. K. Fee..... " .....Osceola, Pa.
H. Clay..... " .....Philadelphia, Pa.
F. A. Eastman..... " ..... "
J. A. Shive..... " ..... "
J. Walton..... " ..... "
J H. Shink..... " .....Sunbury, Pa.
J. M. Stambach ..... " ..... Owego, N. Y.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
July 15, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since July 1, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the JOURNAL *as possible.*

NEW OFFICES.

366 Albin, Iowa.
14 Booth Bay, Me., heretofore an Other Line office.
356 Bellevue, Iowa.
17 Biddeford, Me.
21 Bay View, Mass.
446 Bolckow, Mo.
196 Barnett, Ga.
28 Deerfield Mass.
21 Danvers, Mass.
483 Dallas, Texas.
46 Dutchess Junc., N. Y., ck. Fishkill, N. Y., heretofore an Other Line Office.
29 Edgecomb House, Groton, Conn., ck. New London, Conn.
40 East Canaan, Conn.
25 East Douglass, Mass.
21 Essex, Mass.
241 Emerald, O.
146 Green Pond, S. C.
25 Greene, R. I.
329 Harrisburg, Ill.
232 Houston, O.
151 Hazelwood, Pa., tariff same as and ck. Pittsburgh, Pa.
17 Kittery, Me.
11 Lincolnville, Me.
308 Milford, Ill.
347 Mapleton, Ill.
140 Petrolia City, Pa.
21 Peabody, Mass.
455 Pickering, Mo.
478 Reams Stock Yards, Ind. Terr.
28 Shirley, Mass.
11 Stockton, Me., heretofore an Other Line office.
11 Searsport, Me., heretofore an Other Line office.
Stoner Station, Idaho, tariff same as Snake River, Idaho
25 Southbridge, Mass.
61 Sewall's Point, Va., Summer Office.
329 Tunnel, Ill.
35 West Charlotte, Vt.
206 Washington, Ga.
17 York, Me.

SUMMER OFFICES RE-OPENED.

* Deal, N. J.
133 Hot Springs, Va.
33 Healing Springs, Va.
39 Lake George, N. Y.
41 Norwood, N. J.
143 Old Sweet Springs, W. Va.
142 Rockbridge Alum Springs, Va.
142 Rockbridge Baths, Va.
143 Sweet Chalybeate Sp'gs, Va.
18 Tiverton, R. I.
Watch Hill, R. I., 15 cents more than Stonington, Conn.
133 Warm Springs, Va.

OFFICES CLOSED.

Douglass, Texas; Locke, N. Y.; Phillipsburg, Clarion Co., Pa.; Snake River, Idaho; South Canadian, Ind. Terr., and Vermillionville, La.

GENERAL INFORMATION.

The following is a revised list of offices on the Alabama and Chattanooga Line, with "tariff for Other Lines," from Chattanooga, Tenn.:

Attalla, Ala.,	50	3	Chattanooga, Tenn.
Carthage, Ala.,	90	6	"
Collinsville, Ala.,	50	3	"
Birmingham, Ala.,	75	5	"
Eutaw, Ala.,	90	6	"
Green Pond, Ala.,	75	5	"
Livingston, Ala.,	100	7	"
Morgansville, Ga.,	25	2	"
Springville, Ala.,	60	4	"
Trenton, Ga.,	25	2	"
Toomsuba, Miss.,	100	7	"
Valley Head, Ala.,	30	2	"

Messages for the following points on Staten Island may be taken and sent to Quarantine, S. I., from which office they will be delivered at charges here given:

	Charges for Delivery.		*Charges for Delivery.*
Castleton Heights,	$0.50	New Dorp,	$1.00
Clifton,	0.50	Port Richmond,	0.75
Elm Park,	1.00	Pleasant Plains,	1.00
Factoryville,	0.50	Princess Bay,	1.00
Fort Wadsworth,	0.50	Richmond Valley,	0.50
Garrett's Sons Station,	1.00	Rossville,	1.25
Gifford's Station,	1.00	Sailors' Snug Harbor,	0.50
Hugenot Station,	1.00	Stapleton,	0.25
Mariners' Harbor,	1.00	Tottenville,	1.00
New Brighton,	0.25	Vanderbilt Landing,	0.25

On and after August 1, 1872, the "tariff for Other Lines" to Tracey City and Sewanee, Tenn., will be 50 and 3 from Cowan, Tenn.

Business for Rising Sun and Patriot, Ind., "offices on Other Lines," will hereafter be transferred at Aurora, Ind., instead of Lawrenceburg as heretofore, ck. Aurora, Ind.

The name of the office heretofore known as Steamboat, Pa., has been changed to Glen Loch, Pa.

The office at 347 Norris, Ill., is in Fulton Co.

WILLIAM ORTON, President.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 17. NEW YORK, AUGUST 1, 1872. WHOLE NO. 114.

THE DIFFERENTIAL GALVANOMETER.

The differential galvanometer invented by M. Becquerel, is one of the most useful and convenient instruments for making electrical measurements which has ever been devised, and is probably destined to be much more extensively used in the telegraph offices in this country than any other form of galvanometer. As in the sine and tangent galvanometer, the needle is poised upon a pivot, or suspended by a silk fiber, but instead of being surrounded with a coil composed of the convolutions of a single wire, as in those instruments, it is surrounded by a coil formed of two wires exactly equal in length, size and conductivity, wound simultaneously round the frame, and similarly situated in respect to the needle, so that when opposite and equal currents are sent through each of the wires the needle remains at zero, the current which passes through one wire exactly neutralizing the effect of that which passes through the other. If the current which passes through one-half of the coil is stronger than that which passes through the other the balance will be destroyed, and the needle will be deflected by the stronger current with a force equal to the difference in the strength of the two currents.

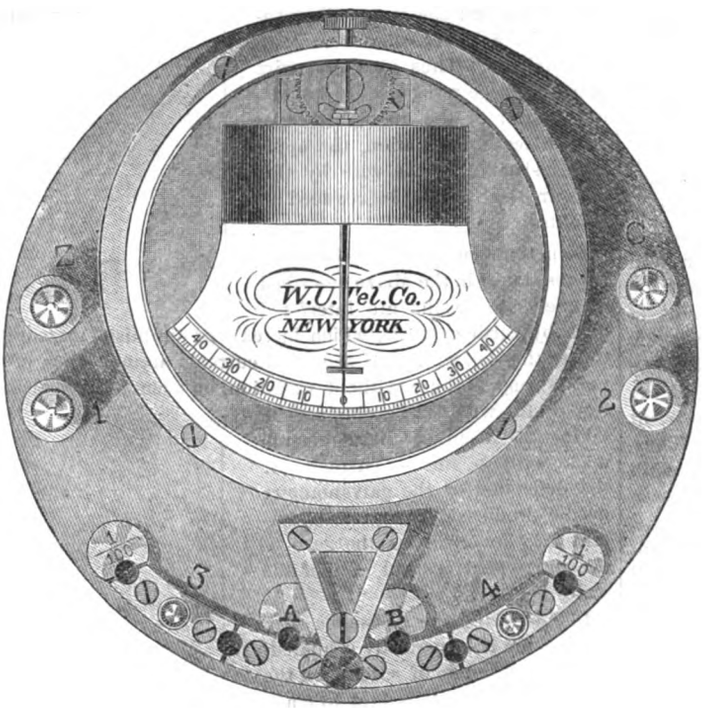


FIGURE 1.

As the strength of an electric current from a given battery upon similar wires is inversely proportional to their length, if the current from a battery is divided between two such wires of unequal length, each connected to one of the wires of the coil, the shorter wire will receive a greater portion of the current than the longer one, and the stronger current in the shorter wire will overcome the current in the longer wire and deflect the needle. The extent of the deflection will be proportional to the difference in the length or conductivity of the two wires, and the direction of the deflection will indicate which of the two wires is the longest.

Figure 1 represents a double shunt differential galvanometer, manufactured by the Western Union Telegraph Company for the use of its employees. The two wires forming the coil which surrounds the needle are indicated by two circular parallel lines, one circuit extending from 4 to B, and the other from 3 to A. These wires have similar resistances, and are situated alike respecting the needle, so that when a battery is connected so as to divide its current between the two halves of the coil, no visible effect is produced upon the needle, the current from 3 to A tending to deflect the needle to the left, while that from B to 4 tends to deflect it to the right; and since both forces are equal, the needle remains in a state of equilibrium. The instrument is provided with two shunts, one for each half of the coil of the galvanometer, so that either one or both halves of the coil may be shunted as desired. Each shunt consists of a comparatively short wire, and has a resistance of $\frac{1}{99}$ of each half of the coil, so that when thrown into the circuit by the insertion of the peg $\frac{99}{100}$ of the current passes through the shunt, and only $\frac{1}{100}$ through the half of the coil of the galvanometer.

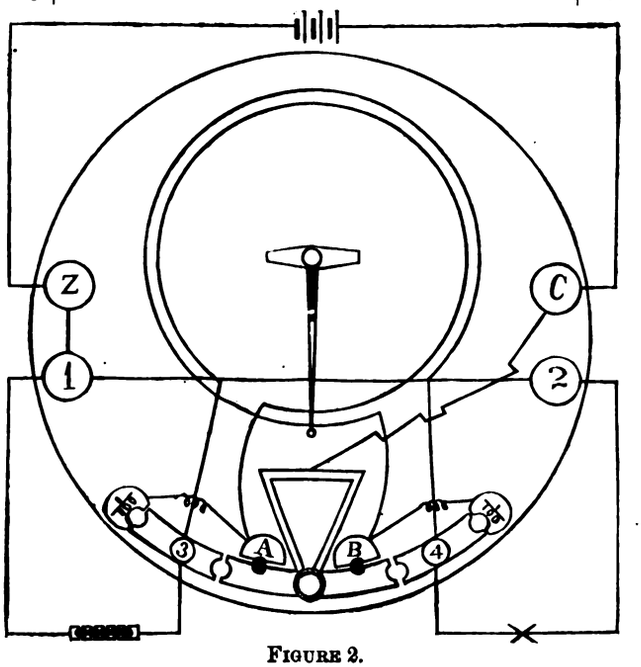


FIGURE 2.

In measuring the resistance of a relay, sounder, wire or any other conductor, both ends of which are at hand, the connections should be made as in the diagram (figure 2).

The positive pole of the battery is connected with the thumbscrew C, and the negative pole with Z; one terminus of the rheostat, or resistance coils, with 3, and the other terminus with 1. The terminals of the wire or helices to be measured are connected with 4 and 2, and pegs inserted at A and B. Resistances are then to be inserted between 1 and 3, by removing the pegs from the resistance coils until the resistance in circuit 1 and 3 equals the resistance in 2 and 4. When the two resistances are precisely the same, and the key is depressed, the needle points to zero of the scale. If the resistance of the wire or helices which are being measured is greater than the rheostat, the current in circuit 1 and 3 will be stronger than that in 2 and 4, and the needle will be deflected to the left. If the resistance of the wire or helices is less than that of the rheostat, the current in circuit 2 and 4 will be stronger than that in 1 and 3, and the needle will be deflected to the right. When the needle is not deflected at all on the depression of the key, the resistances of the two circuits are equal, and the sum of the resistances inserted by the removal of the pegs in the rheostat, is equal to the resistance of the wire or helices which are being measured.

The resistance coils of the rheostat which accompanies the differential galvanometer contain respectively 1, 2, 3, 4, 10, 20, 30, 40, 100, 200, 300, 400, 1,000, 2,000, 3,000 and 4,000 ohms, the sum of which is 11,110 ohms, which is the limit of measurement by the above plan. When higher resistances are to be measured, a peg should be inserted in the orifice between the metallic bar 3 and the disc marked $\frac{1}{100}$, the other connections remaining as before. T

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portion of the current which traverses the circuit from C to 1 through the rheostat will now be divided into two parts, $\frac{99}{100}$ traversing the shunt, and $\frac{1}{100}$ traversing one-half of the coil of the galvanometer. As only $\frac{1}{100}$ of that portion of the current which passes from C to 1 goes through one of the wires of the galvanometer, while the whole of that portion passing from C to 2 passes through the other wire of the galvanometer, it is necessary, in order to produce equal effects upon the needle and to maintain its equilibrium, that the current in the circuit extending from C to 1 should be one hundred times stronger than in that from C to 2. This is effected by making the resistance of the rheostat one hundred times less than that of the wire, helices or other conductor which is being measured. The resistance of the coils which are inserted by removing the pegs from the rheostat must then be multiplied by one hundred in order to get the actual resistance of the conductor. Resistances as high as a million ohms can be measured by this method.

For measuring resistances of less than an ohm, the connections should be substantially the same as in figure 2. Care should be taken, however, to use short and thick copper wires for connecting the rheostat with terminals 1 and 3, so that there may be no appreciable resistance added by the connecting wires. A peg should be inserted in the orifice between the metallic bar 4 and the disc marked $\frac{1}{100}$, so as to introduce the shunt in the circuit containing the short wire to be measured. When the needle remains at zero, on depressing the key, the resistance of the wire will be $\frac{1}{100}$ of the amount which has been inserted in the other circuit by the removal of the pegs in the rheostat. Thus, if a piece of No. 8 iron wire $26\frac{4}{10}$ feet in length (one two-hundredths of a mile) be inserted between 4 and 2, a peg being inserted at orifice marked $\frac{1}{100}$, and it requires 6 ohms to be unplugged in the rheostat to balance the needle, then the $26\frac{4}{10}$ feet of wire will have a resistanee of $\frac{6}{100}$ of an ohm, and a mile of such wire would have a resistance of $200 \times \frac{6}{100} = 12$ ohms.

In measuring line resistances exceeding one megohm, [1,000,000 ohms] the following plan may be used: Connect the line to 4, and the positive pole of the battery to 3, the negative pole being grounded; insert pegs at A and B, and observe the deflection, which should not exceed 40. Remove the line wire and insert one end of a resistance coil whose opposite end is grounded. Shunt the galvanometer by inserting plugs on both sides, and reduce the number of cells in the battery to one-tenth of the original number. Then vary the resistance coils so as to reproduce the same deflection as before, by causing the same quantity of electricity to pass through the galvanometer, and the resistance of the line will be found by multiplying the number of ohms unplugged in the rheostat, by 100×10, or one thousand, the joint diminution of the current passing through the coil of the galvanometer by the shunts and the reduction of the battery.

In testing a telegraph wire for resistance to conductivity, when the atmosphere is dry and there is no escape of the current or mixture with those on parallel lines, the connections should be made as in the following diagram (figure 3). The positive pole of the battery is connected to thumbscrew C, and the negative pole grounded. A ground wire is attached to thumbscrew Z, which is connected by a wire with 1. One end ot the rheostat is connected with 3, and the other end with 1. One end of the wire to be measured is connected with thumbscrew 4, and the distant end is grounded. When pegs are removed from the rheostat until the needle of the galvanometer remains at zero unaffected by the closing of the key, the resistance of the wire will be equal to the resistance unplugged in the rheostat. To ascertain the mileage resistance of the wire, its total resistance must be divided by its length in miles. Thus, if the total resistance of the wire is 4,000 ohms, and its length 250 miles, the mileage resistance will be $4,000 \div 250 = 16$ ohms.

In testing for resistance to conductivity in this manner, care must be taken to ascertain whether there is any escape of the current, or mixture with other currents, arising from imperfect insulation, for if there is the resistance of the circuit will be diminished and the wire will apparently be a better conductor than it actually is. Thus, if upon a wire whose mileage resistance is 16 ohms, one-quarter of the current escapes from defective insulation, the apparent resistance of the wire by this measurement would be reduced to 12 ohms.

Sometimes, when a wire is tested for resistance in the above described manner, the results are interfered with by earth currents, which increase or diminish the testing current. If the earth currents are not very strong, and are without variation, an accurate test of the wire can be obtained by taking the mean of measurements made with + and − currents, or the deflection of the galvanometer needle produced by the earth current may be taken as the zero of the instrument instead of 0 of the scale.

In measuring the resistance of a wire which is imperfectly insulated, or where it is one of several on the same set of poles, it is best to make a loop by connecting it at the distant station without ground with another extending between the same places. The termini of the loop are then connected with the galvanometer in the same manner as the termini of a helix, as illustrated in figure 2. The ground wire is removed from the battery, and the negative pole connected with thumbscrew Z.

The mileage resistance is obtained by dividing the total resistance of the loop by the number of miles of wire which is embraced in it. Unless there is an escape upon both wires used in forming the loop, this method will give reliable results. If there are three or more wires running to the distant station, the measurement can be made with still more accuracy by the following method: After one loop has been tested, substitute a third wire in place of the second in the loop, and make another test; and then substitute the second wire in place of the first, and test again. Thus, for example, if the resistance to conduction of wires Nos. 1, 2 and 3 is wanted, connect at the distant station first Nos. 1 and 2, and measure the resistance of the loop so formed. Then connect Nos. 1 and 3, and measure the loop embracing those wires. Then connect Nos. 2 and 3, and measure their resistance. The resistance of each of the three conductors can then readily be obtained from these figures. Thus, suppose that Nos. 1 and 2 looped together measure 6,000 ohms, Nos. 1 and 3 measure 7,000 ohms, and Nos. 2 and 3 measure 8,000 ohms. By adding together the resistance of the first two loops, and substracting the resistance of the third, and dividing the remainder by 2, the resistance of No. 1 is found to be 2,500 ohms. [6,000 + 7,000 − 13,000 − 8,000 − 5,000 ÷ 2 = 2,500.] Subtracting this from 6,000, the resistance of No. 2 wire is found to be 3,500, and subtracting the latter amount from 8,000, gives 4,500 ohms as the resistance of No. 3.

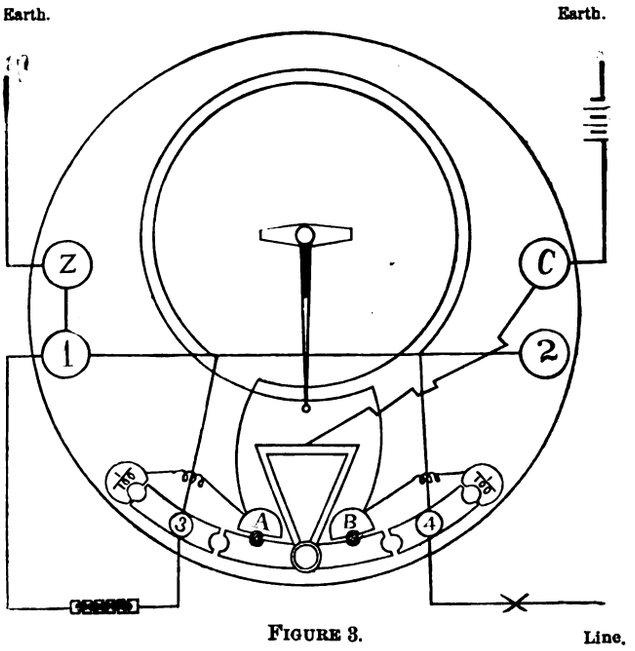


FIGURE 3.

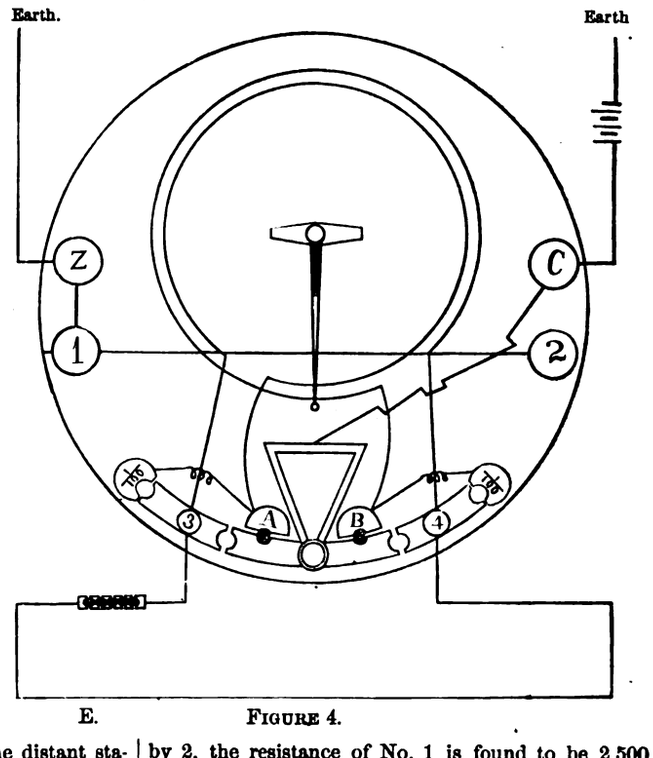


FIGURE 4.

The advantages arising from this mode of testing are that all interferences from extraneous currents and inaccuracies due to imperfect ground wires, as well as to escapes and earth currents, are avoided. In measuring the insulating resistance of a wire, the mode employed is similar to that illustrated in figure 3 for measuring its resistance to conductivity, except that in measuring the resistance of the insulation

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the distant end of the wire is insulated or disconnected from the earth. In making this measurement, however, the resistance of the wire should be carefully obtained, because a wire of great resistance due to imperfect joints, or the presence of many helices of long, fine wire, would apparently increase the resistance of the insulation.

To obtain the mileage resistance of insulation of a wire, its total insulating resistance must be multiplied by the length of the wire in miles. Thus, if the insulating resistance of a wire which is three hundred miles long is 6,000 ohms, its mileage resistance would be 1,800,000 ohms, because the loss of current by escape would be three hundred times greater upon the whole line than upon a single mile.

Daily measurements of all the principal circuits ought to be made and recorded for comparison, so that any fault, however trivial, may be at once detected and removed. Every wire should be so well insulated as not to measure less than one million ohms per mile, although this standard of excellence is rarely ever attained in very rainy weather in any country. In England, some of the best lines show an insulating resistance in damp weather of less than one hundred thousand ohms per mile. Of course, such low insulation as this would not admit of practical working, except upon lines of comparatively short extent, or where a very large conductor was used. Mr. Culley, the Engineer in Chief of the English Post Office Telegraphs, states that the insulation per mile, on two wires extending between Dublin and Belfast, was reduced from 78,750,000 ohms per mile, in fine weather, to 131,300 ohms per mile during a rain, and yet that the lines worked well. The secret of their working was the shortness of the lines, 126 miles, and the large wires, Nos. 4 and 8 gauge. The successful working of a wire depends upon the proportion of the entering current which reaches the distant end. Calling the current upon the line, near the battery, the entering current, and that at the distant end of the line, near where it enters the ground, the arriving current, then the distance to which any given fraction of the entering current will reach, is directly proportionate to the square root of the conductivity of the wire, to the square root of the insulation. In the above mentioned case a sufficient quantity of the entering current would arrive at the distant station to work the instruments well. But suppose the line were thrice as long, and the mileage insulation the same, the fraction of the entering current which would arrive at the distant end would not be sufficient to work the apparatus. Long lines therefore require better insulation than short ones.

Figure 4 represents the connections to be made with the differential galvanometer when locating the distance of a ground connection by the loop test. Connect the wire to be tested for the fault with a good wire at the distant station, and the defective wire to one end of the rheostat, the other end of which is attached to thumbscrew 3. Connect the good wire to thumbscrew 4, the positive pole of the battery to C, and ground the negative pole. When the key is depressed the current will enter the two wires through the termini of the loop and return through the connection with the earth at E; and as the distance between the rheostat and the ground contact at E is less than that between 4 and E, the current between 3 and E will be stronger than in 4 and E, and the needle will be moved to the left. Resistance must now be added to 3 and E, by removing the pegs in the rheostat until the needle is balanced, when the resistance in 3 and E will equal that of 4 and E. Subtract this resistance from the total resistance of the loop, when the wires which compose it are in good order, and divide the remainder by 2 and the quotient will be the resistance of the defective wire between the testing station and the fault.

For example, suppose the resistance of the loop to be 500 ohms, and that it requires 100 ohms to be unplugged in the rheostat to bring the needle to zero, then $\frac{500-100}{2} = 200$ ohms, the resistance of the faulty wire between the station tested from and the escape.

Let 4 E — x and 3 E — y.

Then x+y—L, the resistance of the loop.. R, the resistance unplugged in the rheostat, + y — x, or 3 R E—4 E, therefore $y = \frac{L-R}{2} = 500-100+2-200$

Suppose that the loop measuring 500 ohms resistance contains 60 miles of wire, then, as the faulty wire measures 200 ohms, we have, by proportion, 24 miles as the distance of the fault from the testing station.

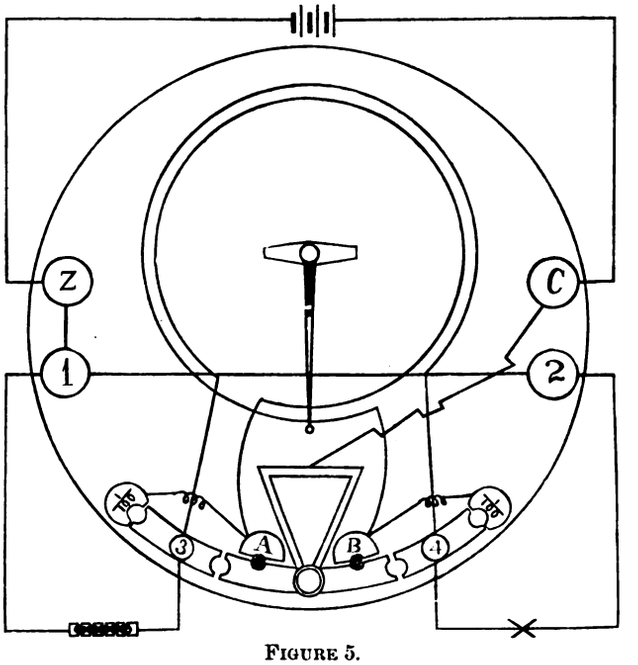


FIGURE 5.

$500 : 60 :: 200 : 24$, or $\frac{60 \times 200}{500} = 24$.

In case the resistance of the loop is not known, it can be found by following the directions previously given, and connecting the wires as illustrated in figure 5.

When a second wire cannot be obtained for making the loop test, the following method may be used for determining the location of a fault:

Ascertain the resistance of the wire before the fault appeared, and call this L; the resistance of the wire when put to earth at the distant end, after the fault has been developed, and call this P; and the resistance of the wire when disconnected from the earth at the distant end, and call this R. Multiply P by P, and R by L, and add the products together; subtract from this sum the product of R multiplied by P, and also that of L multiplied by P, and deduct the square root of the remainder from P. The remainder will give the resistance of the wire between the station tested at and the fault.

Suppose, for example, that the wire has a resistance of three hundred ohms, and the escape of two hundred and eighty-eight ohms, and that the latter is situated at a distance of two hundred and four ohms from the testing station.

$$L = x + y = 204 + 96 = 300.$$

$$P = x + \frac{y \times z}{y + z} = 204 + \frac{96 \times 288}{96 + 288} = 276.$$

$$R = x + z = 204 + 288 = 492.$$

$$\left.\begin{array}{l} P \times P = 276 \times 276 = 76.176 \\ R \times L = 492 \times 300 = 147.600 \end{array}\right\} 223.776.$$

$$\left.\begin{array}{l} R \times P = 492 \times 276 = 135.792 \\ L \times P = 300 \times 276 = 82.800 \end{array}\right\} \frac{218.592.}{5.184.}$$

Deducting the square root of 5.184 from P (276—72 — 204), we have 204 ohms as the distance of the escape from the testing station.

For measuring the internal resistance of a battery with the differential galvanometer, the following method is employed: Connect the positive pole of the battery with C, and the negative with 3, inserting a plug at A, and also in the orifice marked $\frac{1}{100}$ on the left hand side of the galvanometer. When the key is depressed only $\frac{1}{100}$ of the battery current will flow through one-half of the galvanometer coil, $\frac{99}{100}$ passing through the shunt. The deflection of the needle must be noted. Now, connect the positive pole of the battery with thumbscrew 4, and the negative pole with one end of the rheostat, the other end of which attach to the thumbscrew 3. Insert plugs at both shunts and at A and B. The portion of the current which flows through the galvanometer now passes through both halves of the coil, and the deflection of the needle is consequently increased. Now remove the pegs from the resistance coil until the deflection of the needle is the same as it was when the current passed only through one-half of the coil, and the resistances unplugged will be equal to the resistance of the battery.

ELECTRIC MANIFESTATIONS OF VOLCANIC ERUPTIONS.—Professor Palmieri records a singular observation on the recent remarkable eruption of Mount Vesuvius. The vaporous emanations alone were observed to be charged with positive electricity, while the ashes alone were charged with negative electricity. Hence electric effects resulted from the collision of the clouds of ashes with those of vapor, thunder and lightning being produced as in an ordinary storm.

A NEW and powerful thermo-electric battery has been invented by Noë, of Vienna. The alloys used are as yet kept secret. It is stated that ten of the elements of the battery are equal to one Daniell cell, and twenty equal one Bunsen cell. Seventy-two elements arranged for intensity decompose water rapidly, two series of thirty-six each operate a Ruhmkorff coil, and four series of eighteen produce powerful electro-magnets. If all that is said of it be true, we have at last arrived at the time when electricity may be turned on like steam, water, gas, or any other agent in common use.

MR. RICHARD A. PROCTOR, in the *Mechanic's Magazine*, seems quite inclined to favor the hypothesist that many, if not all meteorites, are derived from the discharge of matter from the sun, and states that, however strange and startling this idea may be at first sight, it cannot be condemned as illusory. He suggests that the solar prominences may result from the shooting forth of liquid or solid masses, or streams of matter, and that what we know as meteorites may have been propelled from beneath the surface of the sun.

Mr. Runyard follows in the same vein, and thinks that even if meteorites are not composed of ejected masses, they may be formed by the aggregation of metallic vapors emitted from the sun or other stars.

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FOREIGN TELEGRAPHIC ITEMS

THE directors of the China Submarine Telegraph Company have declared a further interim dividend of 3s. per share on account of the profits for the year ending June 30, 1872. The directors of the British Indian Telegraph Company have declared an interim dividend of 6s. per share on account of profits for the year ending December 31, 1871.

THE receipts of the Great Northern Telegraph for June, was 214,796fr. (£8,595), against 138,390fr. (£5,536) in 1871, showing an increase of 76,400fr. (£3,056). In the corresponding month of June, last year, only the Hongkong-Shanghai section of the China cables was open.

THE Indo-European Telegraph Company have at last reduced their tariff, but still not to such an extent as to lead to the use of their line for family communications.

IT is officially notified that the Telegraph Construction and Maintenance Company (Limited) have successfully repaired the Brest end of the French Atlantic Telegraph Company's main cable. The Maintenance ship Robert Lowe was employed for the purpose, and Captain Halpin had charge of the expedition. The necessity for this repair was referred to in the directors' report to the general meeting of the 6th March last.

BRITISH AUSTRALIAN TELEGRAPH.—Full powers have been granted to the directors for raising the capital required for a cable from Port Darwin to the Norman River in Queensland, at such time and in such manner as they may determine. This extension is to be made in compliance with the wish of the Queensland Government. With regard to the interruption of the cable between Java and Port Darwin, we learn that the Telegraph Construction and Maintenance Company are under contract to repair the cable at their own expense.

POST OFFICE TELEGRAPHS.—The total number of messages forwarded from Postal Telegraph Stations tions in the United Kingdom during the week ending the 6th July, 1872, and during the corresponding week of 1871: Week ending July 6th, 1872, 294,496; week ending July 8th, 1871, 241,726; increase in the week of 1872, on that of 1871, 52,770.

THE GERMAN TELEGRAPHS.

The administration of the German Telegraphs has just published the annual statistical returns of the department for 1871, from which we perceive that there was a considerable augmentation of the traffic, as compared with the previous years. At the close of last year there were ninety-nine branch establishments—of which twenty are at Berlin alone— and 1,093 telegraph stations. The largest number of telegrams, 3,806,187, passed through the offices at Berlin—the receipts from which amounted to 542,558 thalers; the second on the list if Frankfort, with 1,996,275 telegrams, producing 241,589 thalers; then follows Cologne, with 1,509,505 telegrams and 157,322 thalers receipts; Hamburg stands fourth on the list with respect to the number of telegrams, 1,091,153, but second only to Berlin as regards the amount received, 314,504 thalers; Breslau comes next with 721,079 messages and 64,599 thalers; and then Dresden, 714,213 telegrams and 51,596 thalers; Halle-on-the-Saal, 540,496 telegrams and 11,988 thalers; Hanover, 503,018 telegrams and 28,923 thalers; Leipzig, 485.605 telegrams and 70,161 thalers; and Stettin, 434,967 telegrams and 59,580 thalers; then follow Bremen, Konigsburg, Magdeburg, Coblenz, Munich, Stuttgart, Carlsrund, etc. The total number of messages sent off was 5,213,837 to places in Germany, against 4,731,919 in 1870, and 1,184,752 to foreign countries, against 958,913 in 1870.

THE TELEGRAPH IN SAN SALVADOR, C. A.

The Republic of Salvador has now about 500 miles of telegraph wire in operation.

The Government is building another line of 50 miles, a second line between San Vincente and Chicameca.

REMARKABLE ELECTRICAL INSTRUMENTS.

At a recent meeting of the Society of Telegraph Engineers in London, first and foremost among the objects of interest was Lord Lindsay's giant electro magnet, by far the largest in the world. It stood in the corner of the largest room, and consists of several straight massive horizontal bars of soft iron, running upon wheels, and so arranged as to form a rectangle; the opening between the poles is narrow, only a few inches. Lord Lindsay had to jump over the bars to get into the open square space in the center, and observers stood outside watching his experiments. The magnet consists of more than 26 ft. of iron, each bar having a sectional area of about 36 inches; we were told, says the *Engineer*, that it weighs about six tons, and has fourteen geographical miles of conducting wire wound around it, the coils being then protected by outer casings of wood. It was charged by means of a powerful battery, but as the Grove's battery used for the purpose is not yet completed, only one-fifth the power of the magnet was, according to Mr. Varley's estimate, developed at the *soirée*. Under these conditions, a plate of copper fell between the poles, at the rate, as nearly as we could judge, of ⅛ inch per second, this slow fall through the air being due to the mysterious action of the magnetic rays upon the electrical currents which those rays induced in the copper plate. One experiment which particularly attracted the attention of the observers, was that of inserting a lighted taper between its poles, where it burnt freely so long as the magnet was charged, but directly the current was broken and the magnetism disappeared, the taper was extinguished.

The induced current produced in the wire by the cessation of the magnetism when the battery current is removed, is so powerful that the shock would probably be fatal to any person who by an unfortunate accident happened to complete the circuit at the time. To guard against this, a very elaborate current reverser has been constructed by Messrs. O. & F. H. Varley, which breaks the circuit gradually by introducing resistances varying from nothing up to infinity. The magnet itself was designed by Mr. C. F. Varley. The conducting wire weighs about 600 lb. to the geographical mile, and is nearly a ¼ inch in thickness. We are told that the battery ultimately to be used with this magnet will consist of 150 of Grove's nitric acid cells, each platinum plate of which will expose a square yard of surface, both sides of the plate included. A battery of this colossal size has never before been constructed, nor indeed at all approached in dimensions.

All the bars of the magnet, as already stated, run upon wheels, and the front bars are governed by a screw motion, so as to accurately adjust the distance between the poles.

In the course of the evening Mr. Ladd froze some mercury, and the solidified metal was allowed to fall between the poles to see what diamagnetic effects would result. There were none at all so far as we could see. Most of the observers had taken the precaution of giving their watches into the charge of attendants, lest their good time-keeping qualities should be destroyed by the action of the magnet upon the steel springs.

Another chief object of interest was Sir William Thompson's siphon galvanometer. The apparatus is now in practical use for the reception of messages through the Indian cables, and it is a good instrument for registering indications produced by feeble electrical currents.

Mr. C. F. Varley exhibited a battery, very useful for testing purposes where high potency combined with extreme uniformity from day to day is of vital importance. He exhibited 1,000 of these cells, as well as a number of condensers invented by him to enable long submarine cables to be worked rapidly and continuously. The sheets of tin foil in these condensers are so completely insulated that when they were charged with 1,000 cells and left for three months, at the end of that time, enough of the charge remained to give a brilliant spark. At the *soirée* he discharged the condensers through a sewing needle; the steel was blown into vapor and molten globules, with a loud report and a bright flash of light; some of the globules were blown to the further end of the room. Fine platinium wire was in like manner blown into vapor, but not into globules.

Mr. Apps, the optician, exhibited a very beautiful Gassiot cascade made by him for Lord Lindsay; the electrical stream passed over the edges of a vase made of uranium glass placed under the receiver of an air pump. He also exhibited a vacuum tube twisted into very large letters, constructed of uranium glass, and exhausted to a high degree so that only ⅛ inch spark was required to illuminate it; this was proved by allowing the spark to pass in air between the terminals of the coil. Mr. Apps also had on view several of his patent induction coils; one of them gave a spark 6 inches in length, though of the size only, he states, of an ordinary coil giving a spark of 1½ inch. One of the most useful instruments he had on view was De Wilde's electrical probe and forceps, as used in H. M's military hospitals and by the Prussians during the late war. The principle of the probe is that it carries within it two wires connected with the opposite poles of a weak battery; a current cannot pass till the ends of the wires at the extremity of the probe touch the bullet; the circuit is then completed, and by an electro-magnetic effect the existence and position of the bullet are made known to the operator. The apparatus is intended to make bullet extraction as easy an operation as possible, attended by the minimum of pain to the sufferer. Among the other things which Mr. Apps exhibited were tubes containing sulphate of strontium and sulphate of barium, which remained phosphorescent many minutes after the cessation of the spark; and an improved Wheatstone's bridge arrangement, giving a scale of differences from 1,000 to 1; there was also included a small ivory disk arrangement for reading off approximately very small resistances, to one millionth of an ohm.

Lord Lindsay exhibited among other things a large induction coil, which gave sparks 20 inches long; this coil was made for him by Messrs. O. & H. Varley. The last mentioned manufacturers exhibited a vacuum tube 9 ft. long, which was brilliantly illuminated. They also exhibited a pencil writing Morse instrument, for which they claimed more cleanliness, and a higher rate of speed than with an ink writer; and among their instruments was one of the vacuum lightning protectors for submarine cables, used to prevent lightning, which may strike the land wire, getting into any cable connected therewith.

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CORRESPONDENCE.

FOLLOWING COPY.

BUFFALO, July 24, 1872.

To the Editor of the Journal of the Telegraph:

The communication of "Savannah," in your issue of July 15th, calls for a reply, inasmuch as the writer of that article asserts that there appears a lack of definition as to the intent of an assumption made by myself, calling forth "Savannah's" reply. What I *then* said I repeat. An operator who will send "Skiagow," when he *knows* it should be *Chicago*, is guilty of unmitigated carelessness. And yet operators *have* sent it so, not because they thought it was according to rules, but merely to gratify a propensity for the ridiculous and nonsensical. What "Savannah" says about "obedience to rules," the relations of the "Company to the public," and those of "operators to their employers," is, perhaps, just as patent to me as it is to him; and, it seems to me, a mistaken inference which leads any one to suppose I argued in this respect contrary to what he does. It may be asked, "How do you *know?*" or, as "Savannah" claims, "certainty is impossible." Let me illustrate. An office receives a message for Smith or Jones, asking the rate of freight, Buffalo to Chicago. The reply reads, "Coal, ten shillings, Bufalow Skiagow." To send this message, as it was intended to have been written, is not guess-work, but a practical application of common sense. Blunders on the part of writers of messages are common in this region, and I maintain that an operator should send and receive not blindly, without regard to sense or propriety, but *understandingly*. It stands to reason that none but intelligent persons are in the habit of using cipher words, and a person of average ability will discover at once whether a message is cipher, or otherwise. As I said before, cipher messages must not be altered under any circumstances whatever, but a person who, through ignorance, misspells a word, thus placing it beyond the hope of comprehension in its intended sense and significance, will, instead of sueing the Company for damages, be much obliged to you for a correction of his copy. This has been my experience universally.

It is, unquestionably, the duty of receiving clerks to re-write the misspelt words, but numbers of them fail to do so. If operators will keep their eyes and ears open, become familiar with the run of business, especially in those offices where a certain and distinct class of business predominates (it may be that I had particular refference to this class), many ludicrous and some disastrous blunders will be avoided. Let us have a moderate exercise of the intellectual faculties, and less of the automatic. I choose to think that telegraphers, as a class, run higher in the scale than mere machines. Perhaps it is the special privilege of boatmen, and such, to massacre and annihilate "the King's English;" and, perhaps, also, my friend "Savannah" has not had the delectable (?) experience of deciphering one of their communications, otherwise he would think as I do in the matter of their writing, which is, that there can be but one opinion about it, and that to send some of their messages verbatum would produce chaos itself.

BUFFALO.

ATHENS, PA., July 24, 1872.

To the Editor of the Journal of the Telegraph:

Noticing an article, signed "Buffalo," in your issue of June 15th, which so nearly concurs with my own views upon the subject he so ably discusses, I feel a desire to contribute just a word on the same. Some years experience have fully convinced me that "Buffalo" knows "whereof he affirms," and that numberless "bulls" are the result of this very "habit or rule" (as he styles it) of "following copy." Also, that a too rigid adherance in some respects, and *great* negligence in others, on the part of operators to obey Rule 24, is, in a great degree, detrimental to the interests of the Company. I, for one, cannot understand, nor do not believe, that Rule 24 is intended to convey the idea that operators should necessarily transmit a word or words "as written," when he or they may chance to know that, if so transmitted, the meaning of such words will indicate something entirely different from that desired by the sender, and also cause the receiver to think there has been a mistake in the transmission. Yet it is an every day occurrence that operators are found interrupting the business of the whole line in the endeavor to settle some petty dispute of this nature or arising from this cause; one insisting that message is written "so and so, and *must* necessarily be so transmitted, while the other claims that there is "no sense in it," &c. In my humble opinion very few messages (cipher messages, of course, excepted) are offered for transmission which a little "common sense" (as "Buffalo" terms it) would not regulate so as to avoid all trouble of this kind. One more point of correction is in transmitting what are termed "obscure and difficult words." Too often is it the case that such words are "rushed" through with so much rapidity that the receiving operator must, of necessity, use his mental qualities for guessing, or cause more or less breaking; and, as we all desire to do as little of that as possible, such words are frequently the "bulled" ones, and when a message has been repeated a few times, the sender would, in many instances, be amused to see his message as it would then appear. I think many will agree with me, that no one thing could possibly conduce more to the interest of the Company than a general reform in these particulars.

"S."

SAN ANTONIO, TEXAS,
July 5th, 1872.

To the Editor of the Journal of the Telegraph:

Will you be kind enough to answer through the JOURNAL the following, which is a matter of controversy between offices:

"Can a message destined for an office on "other line" be sent checked paid *half* rate to our terminus, collecting tariff for other lines at full rates?"

N. J. PETRICH, Manager.

Answer.—No; unless the other line is a "half-rate office. Full rates for "this" and "other lines" should be charged.

WASHINGTON, MO., July 13, 1872.

To the Editor of the Journal of the Telegraph:

Will you please give me, through the columns of the JOURNAL, the law imposing a fine of one thousand dollars, or twelve months imprisonment in the penitentiary, for the divulging or making known the contents of a message?

WASHINGTON, MO., OFFICE.

Answer.—We are not familiar with the Statute laws of the State of Missouri. Ask your Superintendent.

To the Editor of the Journal of the Telegraph:

Is the Company legally bound to deliver prepaid telegrams at any point within the corporate limits of a city without additional charge?

ENQUIRER.

Answer.—No.

DEXTER, ME., OFFICE desires to know how many words there are in the following message:

"We have gone to M. H. Lake."

Answer.—From the face there are seven. It is impossible to say what M. H. Lake is, as it is written. It may mean Moosehead Lake, or it may be the name of a person. If the former, it being the name of a place, there would be but five words.

ANSWERS TO CORRESPONDENTS.

There are nine words in the following message:

"Our agent will be in Holly Springs Thursday or Friday."

The attention of the Manager of Jackson, Miss., office is called to the foregoing. Rule 9 is very explicit, and it covers this case exactly.

THE questions put by E. F. Knibloe of Hunt's station, are very indefinite.

The length of circuit that it is possible to work with "sounders" alone, and four common local jars, depends upon the size of the wire in the "sounder," the size of the line wire, and the strength of the battery. Under certain circumstances the *materiel* given above would be sufficient to work a circuit of two hundred miles.

M. KOHLFURST has devised an arrangement of a copper and zinc battery, somewhat similar to the Meidinger gravity battery, which he states will, if used for ringing electric bells, give a constant current for a year at the cost of 1½ lbs of crystals of sulphate of copper. A truncated hollow cone is thoroughly varnished inside, filled with crystals of sulphate of copper and placed mouth downwards in a glass jar deeper than itself. This cone has notches round the rim, and has a small hole in the center at the top. The positive pole is a thick cake of zinc suspended over the face of the cone; it is cast with a hole in the center through which passes a gutta percha covered wire, which is connected with the upper cone. The glass cylinder is filled with water, and it is evident that the rate of solution of the sulphate of copper depends upon the facility with which it is dissolved by the access of water through the notches in the cone, and as this takes place at a uniform rate the current given by the battery is uniform also. A dilute solution of sulphate of magnesia or common salt may be used instead of plain water, if it required to diminish the internal resistance of the battery.

ELECTRICITY seeks always an equilibrium in its distribution through matter. If there is an excess in one place, it always seeks to transfer itself to other places, where there is less, or a deficiency.

The production of electricity, from whatever source, is always twofold, or in two directions, one surface or part of our apparatus becoming always *positive*, while another becomes *negative;* thus suggesting the idea of a gain on one side, and loss on the other of a corresponding amount of electricity—in other words, of a *disturbance of equilibrium*. Thus the rubber and prime conductor of the electrical machine, the platina and zinc plates of the battery, and the antimony and bismuth of the thermo-electric pair, become respectively electro-positive and electro-negative, as the first condition and fact of electrical excitement.

THE electrical conducting power of a metal is diminished by heating it. A poor conductor is more easily heated by an electrical discharge than a good conductor. Thus a stroke of lightning that would fuse an iron rod would not injure a copper rod of the same dimensions. The conducting power of copper is 120, while that of iron is only 24.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory, and Province on the continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, AUGUST 1, 1872.

SERVICE UPON ATLANTIC CABLE BUSINESS.

If there is one thing more surprising than the fact that it is possible to transmit intelligence beneath the waters of the broad Atlantic, it is the celerity with which that business is performed. In the average time upon each message transmitted between New York and London, the service is barely equalled by the best managed circuits wholly upon the land. For the seven days ending July 20, 1872, the actual time averaged upon messages exchanged between New York and London was 13 minutes and 59½ seconds. That is to say, that a telegram addressed to London, leaving New York at 9 A. M., New York time, reached its destination at a fraction less than 9:14 of same time. When the distance is considered, the fact that the message has to be rewritten four times—at Plaister Cove, Heart's Content, Valentia, and London, and that this is the average upon the whole business for the week, and not the time upon any one message—it speaks volumes for the business management and the skill of the operators engaged.

That the average time of this week was not exceptional we have ample proof upon the examination of the record.

An exact record is kept of every message by each of the Companies engaged in its transmission, the precise time of its reception at each office is taken, and from this a daily and a weekly average is made.

In this average, "press" and government despatches are included, which, from their much greater length than ordinary business messages, serves to place the average time somewhat greater than is really occupied in the transmission of business for the general public.

Messages between New York and London pass over the wires of four Companies—the Western Union, to Plaister Cove; the New York, Newfoundland and London, from Plaister Cove to Heart's Content; the Anglo-American, from Heart's Content to Valentia, and from Valentia to London, by the British lines.

On one of the seven days given above, the average time of transmission between New York and London was actually only six minutes and thirty-five seconds; and the shortest average time for messagess for the entire day over one of the four lines was one minute and four seconds.

It is difficult to see wherein this service can be improved, and yet efforts are being made to that end. Mr. H. H. Ward, Superintendent of the New York, Newfoundland and London Telegraph Company, and Mr. Stearns, the inventor of the improved duplex instrument, have left for Plaister Cove and Heart's Content to introduce the double transmitter upon the wires between those points, and the Western Union Company have under consideration the advisability of placing them upon the circuits between New York and Plaister Cove, and also to place Heart's Content in direct communication with New York, thus avoiding one re-writing. When these improvements take place, the average time of transmission between New York and London will be reduced to a minimum.

JUDGE PALMER has returned from his European trip, whither he had gone for "free air and out-of-door exercise," seeking by this means to recover his health, which had been somewhat impaired by a too close attention to his duties. Judging from the many countries visited in the course of his tour, the search for out-of-door exercise was very successful, and we are glad to be able to state that Mr. Palmer has been greatly benefitted thereby. During his absence of nearly seven months he visited all of the principal cities of Great Britain and the Continent, spending a month at Rome. Traversing the principal part of Spain, he crossed over from Gibraltar to Tangiers, in Africa, returning *via* Genoa. Altogether the trip was very enjoyable, leaving but one regret—that it could not last longer.

PRESENTATION.

MR. D. H. Fitch, at Moberly, Mo., was made happy last week by the presentation to him of a "Siemens' Universal Galvanometer," from some seventy-five of the operators of the St. Louis, Kansas City and Northern Railway; the occasion being the retirement of Mr. Fitch from the superintendency of the telegraph wires attached to that road. The usual speeches were made, and from the sentiments therein expressed, we should judge that Mr. Fitch was very popular with his subordinates. Altogether, a very happy, pleasant time was had. The galvanometer was imported at a cost, including a gold inscription plate, of over two hundred dollars.

THE contributions to the Reid Testimonial fund are reaching the Committee in gratifying amounts.

Mr. Reid sailed for Europe in the steamer Baltic July 6th, and expects to be at home again about the middle of September. So the time is short to accomplish all that is desirable. It is the wish of the Committee that whatever may be decided upon to present to Mr. Reid should be ready upon his arrival; and, in order that this should be the case, those who have subscribed, but not yet remitted, should at once do so.

We will shortly give acknowledgments of receipts.

ATTENTION is called to the advertisement, in another column, for a partner in the telegraph supply business.

WE have received a communication from Mr. S. J. M. Bear, of the Western Union Telegraph Office at Mitchell, Iowa, in which he claims priority of invention over Himmel, in the improved battery, a full discription of which we published in our issue of June 1, 1872.

The prominent feature of this battery, the inverted reservoir of sulphate of copper, he publicly exhibited to operators and others at St. Ansgar, Iowa, some years ago, and at the time of his invention he had a full description of the same sworn to before a Justice of the Peace. He has been experimenting ever since, and believes now he has the best form of battery known, and intends at once to apply for a patent.

J. M. WALKER, of Bluff City, Ill., wishes us to explain the theory of lightning rods; the protection they afford, and the style and manufacture considered best.

We regret to say that our education has been wretchedly neglected upon the subject of lightning rods; but in a general way we have an intuitive idea that they are presumed to attract atmospheric electricity and conduct it to the earth, at such times, among others, when the accumulation is so great as to endanger property at the time of its discharge.

From our own experience we have a great horror of lightning rod men; they are so persistent in their efforts to "protect" a man's property, and they come in such swarms, scenting out a new building as rapidly, and with as much certainty as a well matured mosquito does a nice fat baby, that we hesitate to express a preference for any particular style or manufacture, feeling certain that if we did so, the agents of the remaining nine hundred and ninety-nine styles would take an early opportunity to renew their calls upon us, a contingency which we are anxious to avoid. Let Mr. Walker address an advertisement to the effect of his letter to us, to the lightning rod men throughout the country, and, at the end of two weeks, if he then survives, we should be glad to publish his experience in the JOURNAL.

THE AUGUST MAGAZINES.

Scribner's Monthly comes to our table as fresh and as full of entertaining matter as ever. The leading artcles upon Yachts and Yachting, The Graphic Art, and the Island of Corfu are profusely illustrated. Much useful information is given under the heading of Nature and Science.

The Phrenological Journal for August maintains its high place among our leading monthlies. Its articles on Hon. Geo. I. Post; the Republican Nominees for President and Vice President, and Fisher Ames, whose portraits are given, are reliable sketches of eminent public men. There is also a good deal of interesting miscellaneous matter.

We have received the second number (August) of the *New Health Monthly*. Good as the first number was, this is far better. Among the contents we would note the first of a series of articles on Popular Physiology. Three Classes of American Girls; Electro-Therapeutics, by A. D. Rockwell, M. D. The Privileges and Penalties of Sex.

THE present address of Charles H. Hubbard is wanted. Will any one knowing his whereabouts please reply through the colums of the JOURNAL?

Also, the present address of A. J. McAnally and his brother F. McAnally. The latter is supposed to have gone West about four years since.

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THE INDUSTRIAL EXHIBITIONS OF 1872.

The Forty-first Annual Exhibition of the American Institute in this city is announced to open, under more favorable auspices than ever before, on the 4th of September, 1872. The exhibition will be held in the large building at Sixty-third street and Third avenue, heretofore known as the Empire Rink, which has been purchased by the Institute, and fitted up expressly for its occupancy at a large expense. For many years these annual exhibitions have been, as it were, milestones of American progress, by which the public have been able to measure the active advance in every department of the arts. It is confidently believed by the managers that the coming exhibition will be by far the most successful one yet held. The Institute this year, and we think wisely, returns to its former custom of awarding medals and diplomas, for articles of superior merit.

The Third Cincinnati Industrial Exhibition will open on the same day as the American Institute, September 4th, and promises to be the finest and most extensive affair that has ever taken place in this country. New buildings have been erected by the association, which will afford an exhibiting space of about seven acres.

The managers have offered quite a list of premiums in the electrical and telegraphic line, among which are silver medals for the greatest improvement in telegraphy, and for the best telegraphic instrument for private use, and a bronze medal for the best burglar alarm telegraph. A silver medal is also offered for the best electric gas lighter. Any information required may be had by addressing the Secretary of the Cincinnati Industrial Exposition.

PICKETT'S MORSE MEMORIAL BUST.

Mr. Byron Pickett, the talented young sculptor, who was entrusted with the design and execution of the Memorial Statue of Prof. Morse, placed by the telegraphic fraternity of the country in Central Park last year, has just executed a small Memorial Bust of the late Professor, which has been warmly commended by the family and many personal friends who have examined it. This bust is sixteen inches high, and of what is called cabinet size, and is finished after the style of the celebrated Rogers Groups.

Mr. Pickett is an artist of superior ability, and we have no doubt but that he will find a large demand for this latest production of his chisel.

Attention is called to his advertisement in another column of this paper.

At the annual meeting of the stockholders of the Maine Telegraph Company, at Bangor, Me., June 26, the following directors were unanimously elected: Hiram O. Alden and W. H. Simpson, of Belfast; Albert W. Paine, J. A. Smith, Albert Hulton and William Gallup, Bangor; Bion Bradbury and W. P. Merrill, of Portland; and E. F. Littlefield, of Winterport. At a subsequent meeting of the directors, Hiram O. Alden was elected President, and W. P. Merrill, Secretary and Treasurer of the Board for the ensuing year.

Our thanks are due to Mr. and Mrs. I. W. Copeland for their kind remembrance, upon the occasion of their marriage, which, as announced in this issue, took place at Brandon, Vt., on Tuesday evening, July 9th. We hope that the happy and successful manner in which everything passed off may prove an augury of happiness and success in the future of the newly wedded couple.

THE MAYOR OF JEDDO AND MAYOR HALL.

The following telegraphic correspondence took place recently between the Mayor of Jeddo and Mayor Hall. So significant a desire as that expressed in the despatch of the Mayor of Jeddo finds a characteristic response in the despatch of the Mayor of the Empire City:

"San Francisco, July 25, 1872.

"To the Mayor of New York:

"The Mayor of Jeddo sends his respects to the Mayor of New York, the metropolis of America, the sails of whose commerce whiten the sea of the Orient, long isolated from western civilization. Jeddo now desires to learn and profit from the wisdom gained by the experience of other cities.

"K. Yuri, Mayor of Jeddo."

"New York, July 25, 1872.

"K. Yuri, Mayor of Jeddo, San Francisco, Cal.:

"A great citizen of New York, Commodore Perry, long ago made us first and best acquainted with Jeddo. Since his death, civilization, aided by her many servants, among whom is the Western Union Telegraph, has made Jeddo our valued neighbor and esteemed civic friend. The Atlantic metropolis joins with the Pacific one in congratulations on this pleasant meeting, either face to face, by the sunlight or the light of electricity. New York city wishes the Mayor of Jeddo a life long enough to see his city the perfect pride of a great empire.

"A. Oakey Hall, Mayor of New York."

Mr. M. H. Redding has been appointed Manager of the office in the New York Stock Exchange, in place of John Horn, Jr., resigned. Mr. Redding is an old and capable operator of many years experience among the brokers. The appointment is an excellent one.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR

Executive Office,
Western Union Telegraph Company.
145 Broadway, New York,
August 1, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since July 15, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff book as soon after the receipt of the Journal *as possible.*

NEW OFFICES.

140 Antwerp City, Pa.
* Big Oak Flat, Cal.
187 Blackshear, Ga.
* Bangor, Pa.
436 Conway, Iowa.
477 Choteau, Ind. Terr., re-opened.
329 Cobden, Ill., re-opened.
18 Cohasset Narrows, Mass.
113 Capon Springs, Va.
389 Cedar City, Mo.
59 Chester Heights, Pa.
261 Denver, Ind.
456 De Kalb, Mo.
387 Ely, Iowa.
483 Ennis, Texas.
271 Frankfort, Ind.
140 Fullerton, Clarion Co., Pa.
57 Five Mile Point, Otsego Lake, N. Y.
20 Fryeburg, Me.
* Gallatin, Mon.
165 Grahamville, S. C.
483 Hutchens, Texas.
375 Kenners, La.
280 Koutts, Ind.
Modesto, Cal., tariff same as San Francisco, Cal., heretofore an Other Line office.
59 Moselem, Pa.
18 Mattapoisett, Mass.
478 McAllister, Ind. Terr.
319 Mill Shoals, Ill.
* New Saybrook, Conn.
66 Nottingham Colliery, Pa., ck. Plymouth, Pa.
377 Port Allen, Iowa.
310 Ridgeway, Ill.
20 Sebago Lake, Me.
92 Shortsville, N. Y., re-opened.
Twilocks, Cal., tariff same as San Francisco, Cal.
169 Unionville, O.
201 Venice, O.
299 Waveland, Ind.
130 Worksburg, N. Y.
20 West Baldwin, Me.

SUMMER OFFICES RE-OPENED.

40 Catskill Mountain House, N. Y.
112 Cresson Springs, Pa.
* Ocean Grove, N. J.
39 Clarendon Springs, Vt.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.		*Leaves this Line.*
Bangor, Pa.	35	2	Portland, Pa.
Big Oak Flat, Cal.	75	35	Sonora, Cal., ck. San Francisco, Cal.
Gallatin, Mon.	100	7	Helena, Mon.
New Saybrook, Conn.	30	3	Hartford, Conn.

OFFICES CLOSED.

Godwinville, N. J.; Hawthorne, N. J.; and Monument, Mass.

GENERAL INFORMATION.

The following is a revised list of offices on the B., N. Y. and P. R.R. line, with "Tariff for Other Lines" from Buffalo, N. Y.:

Arcade, N. Y.	40	3	Buffalo, N. Y.
Elma, N. Y.	30	2	"
East Aurora, N. Y.	30	2	"
Eldred, N. Y.	55	4	"
Franklinvill, N. Y.	45	3	"
Holland, N. Y.	35	2	"
Ischua, N. Y.	50	3	"
Larabees, N. Y.	55	4	"
Machias, N. Y.	45	3	"
Port Allegheny, N. Y.	60	4	"
Protection, N. Y.	35	2	"
South Wales, N. Y.	35	2	"
Yorkshire Centre, N. Y.	45	3	"

Business for offices on the Alabama and Chattanooga line, named in last Journal, may be sent via. Meridian, Miss., if more direct than via. Chattanooga, Tenn., at the following "Rates for Other Lines:"

Attalla, Ala.	80	5	Meridian, Miss.
Carthage, Ala.	50	3	"
Collinsville, Ala.	90	6	"
Birmingham, Ala.	75	5	"
Eutaw, Ala.	50	3	"
Green Pond, Ala.	60	4	"
Livingston, Ala.	30	2	"
Morgansville, Ga.	100	7	"
Springville, Ala.	75	5	"
Trenton, Ga.	100	7	"
Toomsuba, Miss.	25	2	"
Valley Head, Ala.	90	6	"

Business for Lincoln, Mattawamkeag, Oldtown, Vanceboro and Danforth, Me., will hereafter be checked to Bangor, Me.

The "Tariff for Other Lines" from Lake City, Fla., to Fernandina, Fla., has been changed to 125 and 11.

Hereafter Edgecomb House, Groton, Conn., will be checked as an Other Line Office. "Tariff for Other Lines" 25 and 2 from New London, Conn.

CUBA CABLE BUSINESS.

The following offices were opened for public business on the Spanish Government lines in Cuba:

Tariff from Havana 40 cents gold for 10 words, and 40 cents for each additional 10 words or fraction thereof.

Mariel,
Cabanas,
La Mulata,
Bohia Honda,
San Diego de Nunez,

WILLIAM ORTON,
President.

TRANSFER SERVICE.

Executive Office,
New York, July 24, 1872.

To Transfer Agents:

All transfer messages must bear the time when received from the customer, as well as the time when transmitted by the operator.

On and after August 12th, *Wheatland, Pa.*, will be added to the list of Money Order Offices in C. O. Rowe's District.

G. H. MUMFORD, Vice-President.

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NOTE ON RECURRENT VISION.

BY PROFESSOR C. A. YOUNG.

In the course of some experiments with a new double-plate Holtz machine, belonging to the college, I have come upon a very curious phenomenon, which I do not remember ever to have been noticed. The machine gives easily intense Leyden jar sparks from seven to nine inches in length, and of most dazzling brilliance. When in a darkened room, the eye is screened from the direct light of the spark, the illumination produced is sufficient to render everything in the apartment perfectly visible; and what is remarkable, every conspicuous object is seen twice at least, with an interval of a trifle less than one quarter of a second—the first time vividly, the second time faintly; often it is seen a third, and sometimes, but only with great difficulty, even a fourth time. The appearance is precisely as if the object had been suddenly illuminated by a light at first bright, but rapidly fading to extinction, and as if, while the illumination lasted, the observer were winking as fast as possible.

I see it best by setting up in front of the machine, at a distance of eight or ten feet, a white screen having upon it a black cross, with arms about three feet long and one foot wide, made of strips of cambric. That the phenomenon is really subjective, and not due to a succession of sparks is easily shown by swinging the screen from side to side. The black cross, at all the periods of visibility, occupies the same place, and is apparently stationary. The same is true of a stroboscropic disc in rapid revolution; it is seen several times by each spark, but each time in the same position. There is no apparent multiplication of a moving object of any sort.

The interval between the successive instants of visibility was measured roughly as follows:—A tuning fork, making 92½ vibrations per second, was adjusted, so as to record its motion upon the smoked surface of a revolving cylinder, and an electro-magnet was so arranged as to record any motion of its armature upon the trace of the fork; a key connected with this magnet was in the hands of the observer. An assistant turned the machine slowly, so as to a spark once in two or three seconds, while the observer manipulated the key.

In my own case the mean of a dozen experiments gave 0s.22 as the interval between the first and second seeing of the cross upon the screen; separate results varying from 0s.17 to 0s.30. Another observer found 0s.24 as a result of a similar series.

Whatever the true explanation may turn out to be, the phenomenon at least suggests the idea of a reflection of the nervous impulse at the nerve extremities—as if the intense impression upon the retina, after being the first time propagated to the brain, were there reflected, returned to the retina, and from the retina traveling again to the brain renewed the sensation. I have ventured to call the phenomenon "Recurrent Vision."

It may be seen, with some difficulty, by the help of an induction coil and Leyden jar; or even by simply charging a Leyden jar with an old-fashioned electrical machine, and discharging it in a darkened room. The spark must be, at least, an inch in length.

MAGNETIC sand is found in immense quantities on the sides of the volcano of Mount Ætna. The specific gravity of this sand is 2.813. Acids have little effect upon it. Analysis gives silica 52.71, magnetic oxide of iron 19.44, alumini 19.09, lime 6.61, magnesia 1.85.

LUMINOUS ELECTRICAL TUBES.

One of the most convenient methods of exhibiting the illuminating qualities of electricity is by means of the Geissler tubes, which now form part of the standard apparatus of colleges and other institutions of learning. The Geissler tube—so called after the inventor, Dr. Heinrich Geissler, of Bonn, Germany—consists of a glass pipe sealed at each end, and also provided at each end with a platinum wire which projects into the tube. The atmospheric air is exhausted from the tube, a small quantity of gas or vapor is introduced, and the tube is then sealed. When the two wires are placed in connection with a Rhumkorff coil, a stream of electrical light passes through the tube, taking various forms and colors, which vary with the kind and density of the enclosed gas. Hydrogen yields a white light; carbonic acid, green; nitrogen, yellow, etc. The most magnificent effects can thus be produced. A practical application of this discovery is a surgical lamp which consists of a small glass tube and bulb. The electric light is produced in the bulb, which may be introduced into cavities for medical examination.

Attention has lately been called to another kind of luminous tubes, also produced by Dr. Geissler, in which luminosity is produced without the use of the coil and electric battery.

Such tubes, which contain small quantities of certain gases, as nitrogen, carbonic acid, hydrogen, or ammonia, become luminous after being exposed to friction with any of the well known producers of electricity, as silk, wool, cotton, or even paper; the best, however, are catskin and prepared india rubber, which is now largely employed in the manufacture of combs, etc., and which is also used in the Holz electric machine. This mass is so very sensitive that it is sufficient to make the tube luminous after it has passed a couple of times through catskin, when it is not even touched, but held two or three inches distant. When a rarefied spiral glass tube was inserted in a larger plain tube, spontaneous discharges of light would continue within the former, even after the luminous state of the whole length had ceased for some minutes, and the color of the light is dependent on the quality of the traces of gas left within the spiral tube. The very curious researches of Dr. Geissler may possibly lead to a clue to the wonderful phenomenon of the aurora borealis.

BORN.

YEAKLE.—At Baltimore, July 14, 1872, to C. Clay Yeakle, of W. U. Telegraph Office, a daughter.

MARRIED.

BARNUM—LITTLEJOHN.—At Topeka, Kansas, July 24, 1872, E. E. Barnum, to Miss Christina D. Littlejohn, Manager of W. U.T elegraph Office, Topeka.

COPELAND—ROSS.—At Brandon, Vt., Tuesday, July 9, 1872, at the Congregational Church, Ithamar, W. Copeland, of Fishkill, N. Y., Supt. of the Dutchess County Telegraph Co., to Miss Mary J. Ross, of Brandon.

DAVY—ROBISON.—On June 20, 1872, at the residence of the bride's father, by Rev. Mr. Moore, J. V. Davy, Operator for the A. & T. Manufacturing Co., Mansfield, O., to Miss Mina Robison, of Shreve, O.

HUBBARD—EDWARDS.—At Champaign, Ill., July 10, 1872, in the First Congregational Church, by Rev. J. S. Frame, Mr. William Hubbard, Manager W. U. Telegraph Office, Monticello, Ill., to Miss Callie G. Edwards, of Champaign.

TAYLOR—HOLT.—At Delphi, Ind., June 27, 1872, by Rev. L. M. Stevens, George M. Taylor, Agent and Operator T. W. & W. Railway, at Clarksdale, Ill., to Miss Bell A., only daughter of Major A. W. Holt.

DIED.

LEUTZ.—Near Reno, Ind., July 15, 1872, Lucinda E., wife of S. R. Leutz, aged 22 years, 4 months and 13 days.

SMITH.—At Baltimore, July 22, 1872, Kirby Barnes, infant son of Robert H. and Annie B. Smith, aged two months and twenty days.

TELEGRAPHERS' INSURANCE ASSOCIATION.

The acknowledgement of receipt on any one assessment is to be understood as an acknowledgement of all previous assessments.

Assessment No. 31.

2	4	6	13	15	16	19	21	23	25	26
28	29	37	42	44	46	49	51	52	53	54
56	59	60	61	64	67	72	77	78	80	82
83	86	88	89	90	91	95	98	99	101	103
104	106	107	108	113	117	121	126	127	129	131
134	141	142	143	144	145	146	150	153	157	162
166	169	172	175	176	177	179	181	183	185	186
187	188	192	199	201	202	208	210	211	213	218
220	225	228	231	235	238	240	242	243	244	245
247	251	252	253	254	254½	255	256	257	258	269
271	274	276	277	278	279	280	281	282	283	285
286	291	297	298	301	303	311	312	316	323	333
341	345	347	349	350	351	352	353	354	367	371
372	378	380	381	383	385	391	392	393	394	398
405	406	411	413	416	418	420	425	426	430	433
443	414	451	453	455	457	459	463	464	466	467
468	469	470	471	474	475	481	506	508	510	514
515	520	526	527	532	533	542	546	547	548	549
552	553	554	555	556	557	562	564	565	573	574
575	577	579	586	587	590	600	602	603	604	615
617	618	622	626	627	630	632	642	649	655	656
662	663	664	669	670	671	672	676	678	679	680
684	685	694	695	997	703	705	712	714	6715	720
721	722	725	726	729	730	731	732	733	734	735
737	738	740	741	742	750	751	756	758	764	766
772	775	776	780	781	782	783	785	786	791	795
797	798	799	801	802	803	808	812	817	820	821
822	825	830	831	832	836	838	841	842	848	850
856	858	859	868	869	870	871	874	875	876	880
883	886	899	901	908	912	915	917	920	922	926
927	931	932	938	939	940	942	943	944	945	952
966	995	996	998	1000	1001	1005	1006	1008	1009	1014
1016	1019	1023	1028	1039	1041	1043	1044	1046	1947	1053
1054	1055	1057	1058	1061	1062	1063	1066	1071	1073	1074
1075	1076	1077	1081	1084	1085	1087	1088	1090	1092	1093
1102	1108	1111	1116	1117	1125	1126	1134	1135	1136	1137
1141	1143	1144	1147	1148	1149	1151	1153	1154	1164	1165
1168	1173	1174	1175	1177	1178	1182	1183	1190	1196	1199
1201	1202	1209	1210	1213	1215	1217	1220	1221	1222	1223
1225	1228	1229	1231	1232	1233	1237	1238	1239	1241	1245
1248	1251	1252	1254	1255	1256	1259	1260	1261	1263	1266
1267	1271	1273	1274	1275	1276	1277	1281	1282	1283	1284
1285	1286	1289	1291	1292	1294	1296	1298	1303	1304	1306
1307	1308	1309	1311	1312	1313	1314	1315	1317	1318	1319
1320	1321	1322	1325	1326	1327	1329	1332	1333	1334	1353
1354	1355	1356	1357	1358	1359	1360	1363	1364	1365	1368
1372	1376	1379	1381	1385	1386	1387	1388	1389	1390	1391
1393	1394	1395	1397	1398	1399	1400	1405	1409	1313	1419
1420	1421	1423	1424	1425	1426	1428	1429	1430	1431	1432
1437	1438	1440	1443	1444	1446	1448	1449	1450	1451	1453
1454	1455	1456	1459	1461	1462	1464	1465	1469	1467	1468
1469	1470	1471	1472	1474	1476	1480	1481	1482	1484	1487
1488	1489	1492	1493	1494	1495	1496	1498	1499	1500	1501
1502	15031	505	1506	1507	1511	1514	1517	1518	1522	1524
1525	1526	1527	1531	1532	1535	1536	1537	1538	1539	1540
1541	1542	1543	1545	1549	1550	1551	1553	1554	1557	1558
1560	1562	1563	1565	1566	1567	1568	1569	1570	1571	1572
1578	1579	1580	1583	1584	1586	1587	1589	1591		

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 18. NEW YORK, AUGUST 15, 1872. WHOLE NO. 115.

WHEATSTONE'S BRIDGE.

If the differential galvanometer were practically as perfect as it is theoretically, it would enable us to make nearly all electrical measurements with great accuracy; but the difficulty of adjusting the two halves of the coil so as to have, at the same time, equal resistances and equal inductive effects, prevents its use where minute accuracy is required, although it is well suited for making all the ordinary practical tests which are necessary in telegraphy. All the advantages, however, which could theoretically be anticipated from that instrument may be practically obtained by means of the Wheatstone Bridge, or Balance, as it is sometimes called.

The principle of the differential galvanometer consists in the arrangement of a coil composed of two wires of equal lengths and resistances, so that if currents of equal strength are sent through them in opposite directions the effect on the needle is nil. The principle of the Wheatstone Bridge is that of causing the compensating currents to pass in opposite directions through a coil composed of one wire by a peculiar arrangement of resistances. This arrangement obviates the difficulties mentioned in the construction of the differential galvanometer, because the movements of the needle are solely dependent upon the alteration in the relative values of the resistances, and in no way upon their inductive effect.

Figure 1 represents a board on which are placed four copper wires, Zb, Za, Ca, Cb, the extremities of which are fixed to brass binding screws. The binding screws Z, C, are connected respectively with the two poles of a battery, and those marked a, b, are connected with the ends of the wire of a galvanometer. By this arrangement a wire from each pole of the battery proceeds to each end of the galvanometer wire, and if the four wires be of equal length and thickness, and of the same material, perfect equilibrium is established, so that a battery however powerful will not produce the least deviation of the needle of the galvanometer from zero. The circuits Z b a C Z, and Z a b C Z, are in this case precisely equal; but as both currents tend to pass in opposite directions through the galvanometer, which is a common part of both circuits, no effect is produced on the needle. Currents are, however, established in Z b C Z and Z a C Z, which would exist were the galvanometer entirely removed. But if a resistance be interposed in either of the four wires, the equilibrium of the galvanometer will be disturbed. If the resistance be interposed in Zb or Ca, the current Z a b C Z, will acquire a preponderance. If it be inserted either in Za or Cb, the opposite current, Z b a C Z, will become the strongest. If the resistance interposed in the wire be infinite, or which is the same thing, if the wire, which we will suppose to be Cb, be removed, the strength of the current passing through the galvanometer will be that of a partial current Z b a, passing through one of the wires, plus the galvanometer wire; the path of the diverted portion of the current being Za. According to this disposition, the force of the original current $= \frac{E}{R+2r}$ +g, and that of the partial current acting on the galvanometer $\frac{Er}{R(3r+g)+2r^2+rg}$; R, being the resistance of the battery; r, that of a single wire, and g, that of the galvanometer.

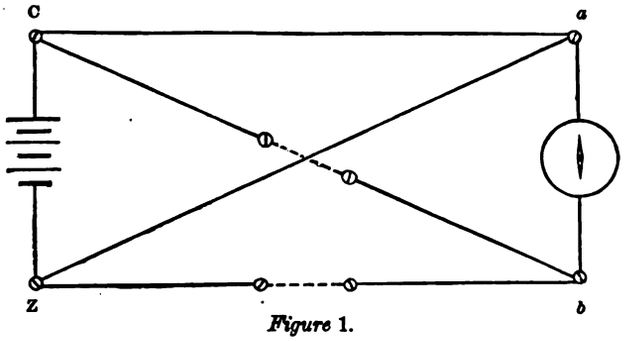


Figure 1.

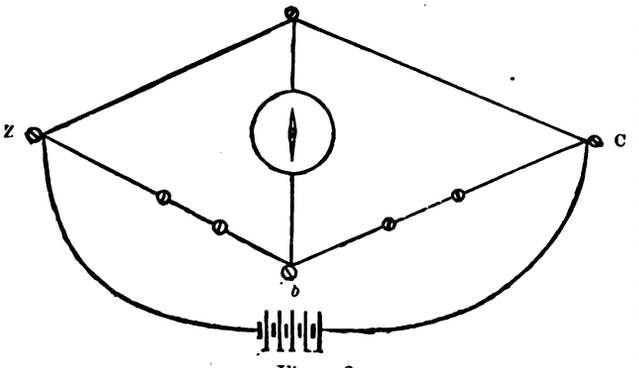


Figure 2.

The equilibrium having been disturbed by the introduction of a resistance in one of the wires, it may be restored by placing an equal resistance in either of the adjacent wires. For the purpose of interposing the measuring resistance or rheostat and the helix, wire or other resistance to be measured, the wires Zb and Cb are interrupted and provided with binding screws for the reception of the ends of the wires. The equilibrium when once established is not in any degree affected by fluctuations in the electromotive force of the battery.

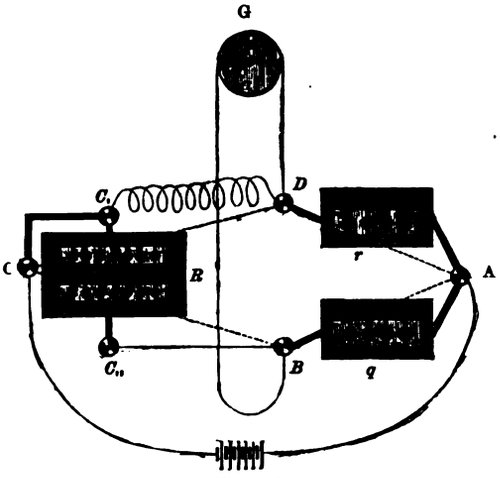


Figure 3.

Figure 2 represents another arrangement of the wires of the bridge in the form of a lozenge, whichis the one generally employed to describe the balance, although in practice the apparatus never bears this form. On comparing it with figure 1, it will be seen that the connections of the resistances and galvanometer in the two are identical, and that they are, in the second diagram, only put into a more convenient form. The latter diagram is more readily borne in mind, and affords great assistance both in comprehending the principle involved and in arranging the connections for a test. The same reference letters are employed, and the preceding observations apply to it equally.

The principle of the Wheatstone Bridge may perhaps be more readily understood, if we illustrate its operation by the variations in the tensions of the electric current upon the various parts of the balance, instead of the quantity of current passing through them, the latter being always proportional to the difference in tension between any two points on the conductor.

If we call the tension at the copper pole of the battery +, and that at the zinc pole —, the tensions in each branch of the bridge, providing the resistances are the same, will fall regularly and gradually from the end which is attached to the copper pole, and will rise regularly and gradually from the end which is attached to the zinc pole, until they both meet in the middle of the wire, where they will be at zero.

The circuit is always divided at some point in the bridge into two branches, and at this point the tensions are equal, while at some other point the two branches are united and the tensions are again equal, whatever may be the lengths of the two intervening circuits. If the resistances are the same in each branch, the tensions will be equal at any two points on the two branches at the same distance from either pole.

In diagram 2, the bridge is composed of four wires of equal length, size and resistances, with a galvanometer connected across at the junctions a and b, and the two poles of a battery connected respectively with C and Z. The current enters the bridge at C and divides into two equal portions, one half traversing the wire C b Z, and the other half traversing the wire C a Z. As the tensions at a and b are both at zero no current will pass between these two points and consequently the needle of the galvanometer is not affected.

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Under the conditions above described the currents on a and C and b and C are both +, while those on b and Z and a and Z are both —. If a resistance be inserted in the wire b C, the zero point will change from b to a point nearer C, the tension at b will become — or less than zero, and a current will flow across the wire between a and b, through the galvanometer, proportional to the difference in tension at these points. If a resistance be now inserted between b and Z, equal to that between b and C, the zero point of the tensions will return again to b, and no current will pass between a and b.

When the needle stands at zero the following relations always exist between the four wires composing the bridge: If Za is equal to Zb, then Ca is equal to Cb; or if Za is equal to Ca, then Zb must be equal to Cb. When Za bears the same proportion to Zb that Ca does to Cb no current will pass between a and b, because the tensions in each branch of the circuit will change in the same proportion and will be equal at the junctions a and b.

Figure 3 represents an arrangement of the bridge suitable for the measurement of any resistance large or small.

A, B, C, D are the four terminal divisions of the bridge; r is a rheostat containing three resistance coils of 10, 100 and 1,000 ohms each; q is a rheostat exactly similar to the preceding, and these two rheostats are connected on one side with the + pole of the battery. On the other side, r is connected with the galvanometer G and the unknown resistance X, and q is connected with the rheostat R at $C_{,,}$ and thence with the — pole of the battery, to which the unknown resistance is also connected through $C_{,}$. The galvanometer G has a coil or multiplier containing about 22,000 turns of wire, and offers a resistance of 6,000 ohms.

The resistances in r and q being the same, in order to ascertain the resistance of X it is only necessary to calculate the resistance unplugged in the rheostat R to bring the needle of the galvanometer to zero, as the resistance inserted in R is exactly the same as the resistance of X.

It is always necessary to place some resistance in DA and BA when a considerable resistance is inserted between DC and BC, otherwise there would be no appreciable difference in the tensions at D and B, whatever the variations in the resistances of CB and CD might be. The greater the resistance to be measured, the greater should be the resistances inserted in DA and BA.

If the resistance of the wire, helix, cable or other substance to be measured which is inserted between C and D, is not greater or smaller than any of the resistances contained in the rheostat R which is inserted between CB, then by unplugging the proper resistance in R the needle will be brought to zero, and the resistance unplugged will be equal to the resistance of the material measured, for DA : BA :: DC : BC; and as DA is equal to BA, DC and BC must also be equal.

If the resistance to be measured is greater than that contained in the rheostat R, the resistance of q must be made less than that of r, and the resistance unplugged in R must be multiplied by the proportion which exists between r and q. If, on the contrary, the resistance to be measured is less than the smallest resistance in the rheostat R, q is made greater than r, and the resistance unplugged in R must be divided by the proportion which exists between r and q. For example, in measuring a resistance greater than that of the rheostat R, suppose q to have a resistance of 200 ohms, r 300 and R 10,000, then—

q : r :: R : X; or, 200 : 300 :: 10,000—15,000 ohms.

In measuring a resistance less than that of the rheostat R, suppose q to have a resistance of 25 ohms, r 5 and R 1, then—

q : r :: R : X; or 25 : 5 :: 1 : —.2 ohm.

The value of the unknown resistance X may also be determined by the following equation:

Let r represent the resistance inserted in DA, q the resistance in BA, R the resistance unplugged in BC in order to bring the needle to zero, and X the unknown resistance in DC, then $\frac{r}{X} = \frac{q}{R}$

It will be seen by examining diagram 3, that the three sides of the bridge DA, BA and BC, are really composed of resistance coils, the intervening wires or metallic rods having no appreciable resistance, and only serving as connectors between the coils. In practice it is quite common to unite r and q in one box, having two parallel sets of resistance of ten, one hundred and one thousand ohms. With the Wheatstone bridge, resistances can be measured ranging from .01 of an ohm to 1,000,000, with the same degree of exactness.

PROGRESS OF THE ELECTRIC TELEGRAPH.

The patent of Morse, who invented the first practical recording telegraph, was taken out in the year 1840; since then, numerous other modes of recording information at a distance by electricity have been invented, and there are now many systems in use, although the Morse telegraph in its various modifications is generally employed in all parts of the world for the general business of telegraphing.

It is curious that just ninety years after Dr. Franklin identified lightning with electricity, by means of his kite, Morse should have schooled electricity to send messages almost instantaneously over wire at great distances.

This all-pervading element manifests itself in countless ways—in the sparkling of animal hair; in the rustling of silk; in the aurora that illumines the North; in the meteor that startles the astonished observer; it flashes in the lightning bolt that rives the oak, without, while it gently penetrates into the lady's parlor and fills her form, as she glides over her warm, thick carpet, until the metal tube of the gas burner will receive enough from her fingers to ignite the gas. It will also convey to her the thoughts of distant minds with more than the assiduity of Puck, by means of the invention of Morse.

Morse was by no means the discoverer of the analogy between magnetism and electricity, but he was the first who made practicable all former discoveries and improvements in the production of a recording telegraph. The two leading properties of electricity that make telegraphs possible are: first, its constant desire to seek an equilibrium, always going where there is less; second, that different substances have very different conducting powers—over some it passes with the utmost freedom, while over others it will scarcely pass at all. On this depends the possibility of telegraphing, since by it the current of electricity may be arrested or conveyed at the will of the operator. Mr. William Sturgeon of London discovered in 1825 that when a bar of soft iron was placed within a coil of conducting wires it was rendered magnetic, and would so remain as long as the current of electricity passed through the wires. The telegraph consists in connecting two of these magnets by a wire of any number of miles in length, and directing through it a current from an electric battery. By throwing on and cutting off the current, the iron becomes alternately charged and at rest with great rapidity. To form the current, it is necessary that the wire should form a circuit, or that each end of the wire should communicate with the ground. The interruption is caused by stopping this communication. The first telegraph invented by Professor Morse consisted of an electro-magnet, formed by bending a small rod of iron in the form of a horse-shoe, upon which was wound a few yards of copper wire insulated with cotton thread. This magnet *h* was then placed upon the middle of a painter's stretching frame for canvas *x x*, the bottom of which was nailed to the edge of a common table. Across the lower part of the frame was constructed a narrow trough to hold three narrow cylinders of wood A B C. A wooden clock D was placed at one end of this trough. The cylinder C, next to the clock, had a small pulley-wheel fixed upon its prolonged axis, outside the trough; a similar pulley-wheel was fixed upon the prolonged axis of one of the slower wheels of the train of wheels outside the clock; these two pulley-wheels were connected by an endless cord or band. Upon the cylinder A, farthest from the clock, was wound a ribbon of paper, which, when the clock train was put in motion, was gradually unrolled, and passing over the middle cylinder B was rolled up upon the cylinder nearest the clock by means of the cord and pulleys.

An A shaped pendulum F was suspended by its apex *f* from the centre of the top of the frame, directly above the centre of the middle cylinder in the trough below. This lever was made of two thin rules of wood meeting at the top but opening downwards about one inch apart, and joined at the bottom by a transverse bar (which was close to the paper as it moved over the middle cylinder) and another about one inch above it. Through the centre of these two bars a small tube was fixed through which a pencil *g* loosely played. The pencil had a a small weight upon its top to keep the point in constant contact with the paper ribbon. Upon the lever directly opposite to the poles of the electro-magnet was fastened the armature of the magnet or a small bar of soft iron. The movement of the lever was guided by stops on the frame at the sides of the lever permitting it only a movement forward to and back from the magnet; the pencil at the bottom of the lever was thus allowed to advance when the magnet was charged and to retreat when discharged, about one-eighth of an inch. The lever advanced by the attraction of the magnet and was retracted by a weight or spring.

The voltaic battery I, or generator of electricity, was connected by one of its poles to one of the helices of the magnet, while the other pole was connected with a mercury cup; and a conjunctive wire connected a second mercury cup to the other helix of the magnet. The circuit was closed by dipping a forked wire into the two cups of mercury, when the magnet became charged, the armature was attracted, and the lever drawn toward the magnet. When the forked wire was removed the magnet was discharged and the spring brought back the lever to its normal position. When the clock-work was put in motion the ribbon of paper was drawn over the middle cylinder, and the pencil attached to the lever being in constant contact with the ribbon of paper traced a continuous line lengthwise with the ribbon.

The pathway of the pencil point, when the lever was attracted towards and held by the magnet for a longer or shorter time, contains the three elements of points, spaces and lines, forming by their various combinations, the various conventional characters for numerals and letters.

At the time of the construction of this first telegraphic instrument, Morse had not conceived the idea of the present *key manipulator* dependent on the skill of the operator, but he presumed that the *accuracy* of the imprinting of signs could only be secured by mechanical mathematical arrangements and by automatic process.

Morse having ascertained that the machinery he had constructed, rude as it was, would move the ribbon of paper at a regular speed, and that the pen-

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cil lever was obedient to the closing and opening of the circuit, the next thing to construct was the manipulator or regulator of the closing and opening of the circuit.

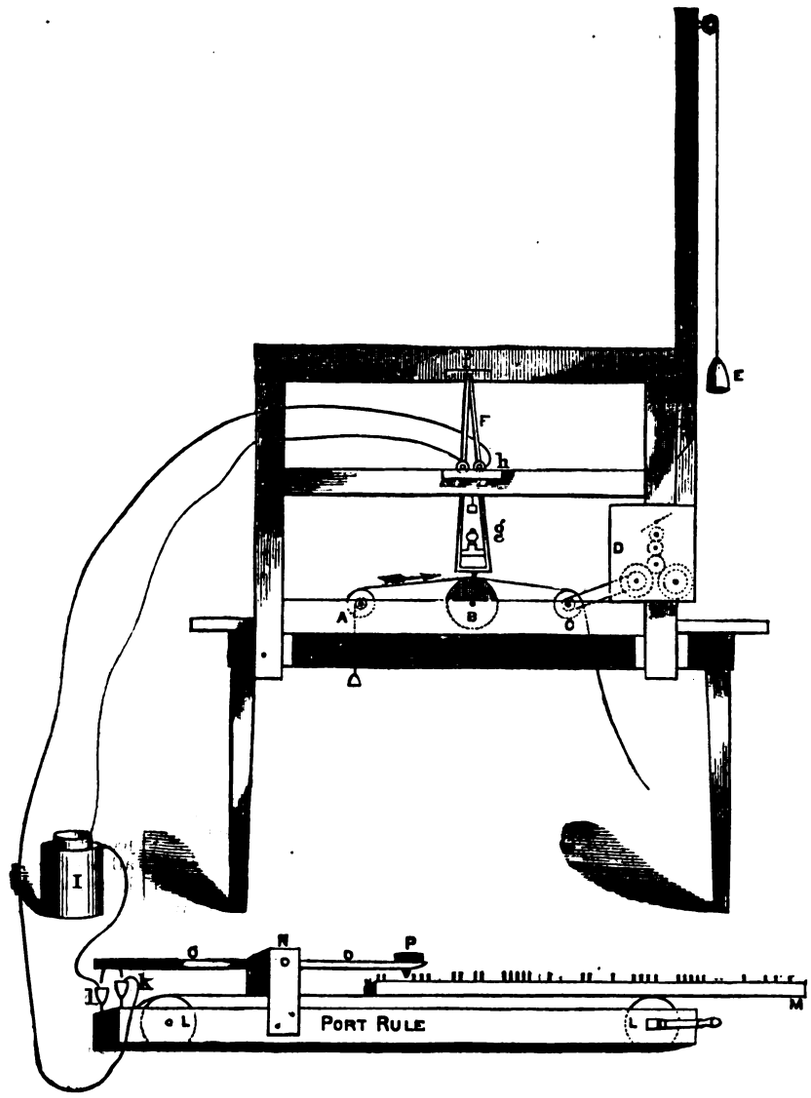
These were now to be put in use.

Morse prepared rules of composing sticks M, fig. 2, of about *three* feet in length each, formed by two strips of wood, so placed side by side as to leave a narrow channel large enough to contain the type in desired order and to allow the cogs of the type to project above the upper edge of the rules. Through and along the bottom of the rules projecting downwards were several needle points about one-fourth of an inch in length; their use will be perceived presently.

A long trough L L sufficiently wide to allow of easy passage of the rules through its length, was constructed with the following parts. Near each end of this trough were two small cylinders, of wood, L L. On the prolonged axle of one of them was a hand crank, and over the two cylinders an endless band of worsted tape about one and a half inches in width, which when the crank was turned passed from end to end of the trough. Midway and across the trough was erected a small frame or bridge N, within which a wooden lever O O was suspended parallel with the endless band, having its fulcrum at N at a point about two-thirds in length, but the longer part reaching from the fulcrum to the end of the trough, on each side of which under the end of the longer part of the lever was placed the *two cups of mercury* J K.

Upon the end of the lever and above the cups of mercury was fixed a forked wire so bent as to connect both cups when the end of the lever was depressed, and to disconnect them when it was raised. At the other or shorter end of the lever a weight P overbalanced the longer part, and on the under side beneath the weight was a beveled tooth projecting downwards. The rule or composing stick, having the type set up, was then placed upon the endless band; the needle points beneath the rule striking through the band and retaining the rule in its place. By turning the crank the rule was made to pass beneath the lever. The first cog of the type coming in contact with the tooth beneath, the weight of the lever raised that end and depressed the other, causing the forked wire to descend into the two cups of mercury, and *closing* the circuit. When the cog has passed the tooth, the weight caused the tooth to fall into the space between the first and second cog, and the fork at the other end of the lever to rise out of the cups of mercury *opening* the circuit. At each dip of the forks into the cups the circuit was closed, the magnet was charged, the armature on the pendulum lever was attracted and the pencil passed from the upper line A (figure 1) to the lower line B. When the fork was raised out of the cups the circuit was opened, the magnet was discharged and the pendulum lever with its pencil resumed its normal position by the action of the spring. A repetition of this process, as the rules with the type passed beneath the tooth on the lever, completed the action of the instrument.

Professor Morse subsequently modified the form of his telegraph, although the principle upon which its action depended remained substantially the same. In place of the wooden cylinders, operated by a wooden clock for carrying the paper band at a regular rate, he employed small brass rollers, moved by means of mechanism analagous to clock-work; and instead of the armature being attached to a wooden pendulum which vibrated over the paper, he attached it to one end of a brass lever sustained in a horizontal position by two pivots, the other end of the lever being armed with a steel



THE FIRST MORSE INSTRUMENT.

point. Under the soft iron armature at one end of the lever was placed an electro-magnet, while the steel point at the other end of the lever was beneath the roller which carried the band of paper. Now, when the circuit is closed—that is, completed—the armature of the electro-magnet is attracted through the magnetism created in the helix by the passage of the electric current, and this attraction causes the point of the pen to touch the paper and to trace upon it a line, the length of which depends upon the duration of time in which the circuit remains whole. If the circuit is opened, the current ceases to flow, the magnetism disappears instantly, and a spring attached to the lever draws it away from the paper, and the line ceases. By opening and closing the circuit rapidly, dots are produced upon the paper, the number of which depends upon the number of times that the circuit is broken and closed. If the circuit is closed for a longer time, a dash or short line is made upon the paper. We have thus the combinations of an alphabet of dots and lines. Thus A is a dot and a dash; B, a dash and three dots, &c. The alphabet is so arranged that those letters occurring most frequently are more easily transmitted; thus, E is one dot; T, one dash. An expert operator can transmit from thirty to forty words a minute by this instrument, on a land line of 200 or 300 miles in length.

The transmitting apparatus is very simple, being designed only for the opening and closing of the circuit in a manner more easy than by holding the ends of the wire in the hands, as is done where there is no apparatus, or by the port rule previously described. The two ends of wire are separated by two pieces of metal, one of which is a brass lever surmounted by an ivory button, and the other is a brass anvil tipped with platinum. The brass lever is mounted upon pivots, in front of the axis of which is soldered a nipple of platinum, which, by the depression of the lever, comes in contact with the platinum tipped anvil, and thus closes the circuit.

To the Morse system, at a latter period, was added the "sounder," a simple contrivance, by which signals are conveyed by sound. Up to 1850 the operator read the dispatch from slips of paper to the copyist, who wrote it down. It was soon found, however, that the dispatch could be read by the "click" of the instruments, and the operator now copies, himself, from sound.

Several modifications of the Morse telegraph have been made, the principal of which is to substitute ink marking for embossing. The Morse telegraph in its various modifications is now used almost exclusively throughout the world.

The number of inventions connected with the electric telegraph is almost endless, and would occupy several volumes for their description; but the only system at present in use for general telegraphic communication in the United States, besides the Morse, is the letter printing telegraph, invented by Mr. G. M. Phelps, and this instrument is only used in four out of the six thousand telegraphic stations in the United States.

Telegraphic stations must be united by one insulated wire, either carried overland or under the sea. The insulation of land lines is insured by attaching the wires to insulators, fixed on posts some twenty feet high. The posts are placed at distances of about sixty yards apart. Insulators are of all shapes and many materials. The insulator most generally used in the United States is made of glass, and is supported by a wooden pin. The leakage in a long line, notwithstanding the best insulation, is consid-

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erable. The loss at each post is insignificant, but when hundreds or thousands are taken into account it becomes decided, so that, in extremely wet weather, in some cases merely a fraction of the total current that sets out reaches the earth at the distant station.

The wire most employed for land lines in the United States is No. 9 galvanized iron wire, although there is considerable of No. 8 and a few thousand miles of No. 7 and 6 in use.

But a little more than a quarter of a century has elapsed since the electric telegraph was introduced to the public as a practical means of communicating intelligence. The first line constructed in the United States was put in operation in the month of June, 1844, between Washington and Baltimore. Up to this time the electric telegraph had been regarded only as a curious theoretical science, without practical application. As far back as 1834 Messrs. Gauss and Weber constructed a line of telegraph over the houses and steeples of Gottingen, using galvanic electricity and the phenomenon of magnetic induction as a motor. The slow oscillations of magnetic bars, caused by the passage of electric currents, and observed through a telescope, furnished the signals for corresponding, but the operation was complicated, slow, and inefficient. In 1837 M. Steinheil established a line of telegraph between Munich and Bagenhausen, a distance of twelve miles; and in 1838 Professor Wheatstone constructed a line between London and Birmingham; but the apparatus employed by each was crude and unsatisfactory, and it was not until Professor Morse perfected his simple and reliable system that the electric telegraph became of practical utility.

During the first few years after the introduction of the electric telegraph, its progress was very slow. Capitalists were afraid to invest in an undertaking so novel and precarious. When one of the most distinguished financiers of New York was asked by the projectors to subscribe towards the construction of the first line from Baltimore to New York, he replied, that he would make them a present of a hundred dollars, but that he would not have his name associated as a stockholder in so wild and chimerical a scheme. After the line was completed, this incorrigible skeptic was amongst the first and best patrons of the Company.

As a natural consequence of the distrust of capitalists, and the great difficulty of raising funds for properly building the lines, they were constructed in a very unreliable manner, and breaks and interruptions was rather the nominal condition of the wires than the exception.

At the commencement of 1848, the length of telegraph wire in operation in this country was about 3,000 miles. At the present time there are over 160,000 miles in successful operation within the limits of the United States, having over 5,000 stations and employing upwards of 10,000 operators and clerks. The gross receipts of the various telegraph companies in this country amounts to upwards of $9,000,000 per annum, while the aggregate capital employed is more than $60,000,000.

The various uses to which the telegraph has been applied is almost innumerable. Among the most important of them may be mentioned its application to the running of trains on railroads; the giving of alarms of fires in our principal cities; its employment in scientific and astronomical observations, and the transmission of weather reports. Within the past few years a new field of usefulness has been opened and partially developed in the application of the telegraph to stock reporting and private line purposes, and in which it has already achieved a marked success, with the promise of becoming, in the future, a still more important branch of the business. The instruments used for this purpose print the despatches in plain Roman letters, without the aid of an operator, at the receiving station. Through the aid of this apparatus, stock and market quotations are received at the exchanges, banking houses, and other places of public resort in the chief commercial cities of the United States, at all hours of the day. This new enterprise, which was inaugurated in 1868, has become one of the most important features of the telegraphic business.

In Europe, the telegraphs, with the exception of the sub-marine lines, are nearly all owned and controlled by the Governments, and in England, they are connected with the Postal Service. In continental Europe the annual expenditures for the telegraphic service exceed the receipts by about two millions of dollars. In England the telegraphs were purchased by the Government in January, 1870. Since then the Government has expended about five millions of dollars in excess of the receipts, but, as a portion of this expenditure is for new construction, it is uncertain how great the annual discrepancy will be.

In December, 1870, a general system of telegraphic money orders or transfers was put into operation in the Pacific States. The public demand for the use of facilities for telegraphic exchange had long been apparent, and had induced the authorization of a limited amount of business, which was conducted with success and profit; but the need was felt of a system which could be adopted generally, without bringing in at the same time new and serious risks. This object has now been attained, and arrangements have been made for opening money order offices in all parts of the country.

The progress of the electric telegraph within the past six years has been very great in every quarter of the globe. Upon this continent the electric wire extends from the Gulf of St. Lawrence to the Gulf of Mexico, and from the Atlantic to the Pacific Ocean. Three cables span the Atlantic Ocean, connecting America with Europe, and another submerged in the Gulf Stream unites us with the Queen of the Antilles. Unbroken telegraphic communication exists between all places in America and all parts of Europe; with Tripoli and Algiers in Africa, Cairo in Egypt, Teheran in Persia, Jerusalem in Syria, Bagdad and Nineveh in Asiatic Turkey, Bombay, Calcutta, and other important cities in India, Hong Kong and Shanghai in China, Irkoutsk, the capital of Eastern Siberia, Kiakhta on the borders of China, Nagasaki in Japan.

A direct line of telegraph, under one control and management, has recently been established between London and India, with extensions to Singapore, Hong Kong, Java and Australia.

Europe possesses 450,000 miles of telegraphic wire and 13,000 stations; America 180,000 miles of wire and 6,000 stations; India 14,000 miles of wire and 200 stations; and Australia 10,000 miles of wire and 270 stations; and the extension throughout the world is now at the rate of 100,000 miles of wire per annum. There are, in addition, 30,000 miles of submarine telegraph wire now in successful operation, extending beneath the Atlantic and German oceans; the Baltic, North, Mediterranean, Red, Arabian, Japan and China seas; the Persian Gulf; the Bay of Biscay, the Strait of Gibraltar, and the Gulfs of Mexico and St. Lawrence.

More than twenty thousand cities and villages are now linked in one continuous chain of telegraphic stations. The mysterious wire, with its subtle and invisible influence, traverses all civilized lands, and passes beneath oceans, seas and rivers, bearing messages of business, friendship and love, and constantly, silently but powerfully contributing to the peace, happiness and prosperity of all mankind.

Professor Morse, who was already past middle age when he conceived the idea of the electric telegraph, on board of the packet-ship, Sully, on her ever memorable passage from Havre to New York, in 1832, and who was nearly three score years of age when his first line was built, lived to witness the consummation of his most ardent anticipations in the use of his invention throughout the world. The invention of Professor Morse, which, although yet in its infancy, has already conferred inestimable benefits upon the people of more than half the globe, without having occasioned a pang of sorrow to a single human being. If he is to be regarded as among the greatest of benefactors who makes two blades of grass to grow where but one grew before, with what affection should we cherish the memory of him through whom wars have been postponed and shortened, peace promoted and extended, time annihilated and distance abolished, and all the highest and noblest faculties of man multiplied, extended, and enlarged.

INVENTIONS AND INVENTORS.

There is a saying that "all great things have had small beginnings," and this is true, not only of electric telegraphs, but also of the great trade of electroplating, and of the magneto-electric machine which is now largely used instead of the voltaic battery. After Volta had made his small and, apparently, unimportant experiments on the electricity produced by metals and liquids, various persons tried the effect of that electricity upon metallic solutions. Bingnatelli, in 1805, found that two silver medals became gilded in a solution of gold, by passing electricity through them. Mr. Henry Bessemer, in 1834, coated various lead ornaments with copper by using a solution of copper in a similar manner. And, in 1836, Mr. De La Rive found that copies might be taken in copper of engraved copper plates by the electro-depositing process. Faraday discovered magneto-electricity in the year 1831, by rotating a disc of copper between the poles of a magnet, and he has stated that the first successful result he obtained was so small that he could hardly detect it. This simple experiment was the origin of the magneto-electric machine.

Persons inexperienced in scientific matters are apt to think that discoveries are generally made by accident. The reverse is, however, the case; nearly all our great modern discoveries were effected by men who were constantly making careful experiments upon the properties of matter and its forces, by subjecting them to new and definite conditions. Nearly all persons look upon such discoveries as fortunate ideas, which, when once found, are quickly developed, instead of which they are, in most cases, slowly developed results of most difficult mental labor.

Discoveries in science are occasionally made, not by original scientific investigators, but by practical men engaged in manufacturing or technical employments. The hydro-electric machine originated in this way: a man at Newcastle was attending to a steam boiler, and found that he received electric shocks when he touched the boiler. This circumstance was investigated by his employer, Mr. Armstrong, a scientific man, and led him to construct the hydro-electric machine. The accumulation of electricity in submarine telegraph cables was also first observed at the Gutta-Percha Company's works, London. It was noticed, on testing the cable by means of a voltaic battery (the cable being submerged in water) that discharges of electricity flowed from the cable after the battery was removed. This circumstance was investigated by Faraday, and led to improvements in submarine telegraphy. In these instances also the same general method was employed, viz., new experiments were made (though not intentionally,) by putting matter and its forces under new conditions, and new results were observed.

Nearly all the improvements which are made in machinery, manufactures, and trades are effected either by inventors who occupy their lives in making inventions and patenting them, or by practical men engaged in trades and manufactures.

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FOREIGN TELEGRAPHIC ITEMS

TRANSANDINE TELEGRAPH.—The successful completion of the telegraphic line across the Andes, placing the Plate in immediate contact with Chili and the Pacific, is reported. The whole of President Errazuriz's address to the Chilian Chambers had been transmitted in less than fifteen hours, comprising over 4,000 words. The Argentine telegraph offices are so busy that this dispatch had to be forwarded by post from Villa Nueva to Buenos Ayres. This line is remarkable for the snow cable in the Andes. The engineer who carried out the work is Mr. Villanueva, under the direction of Messrs. Clark, of Valparaiso.

AN accident of unusual character happened a few days since to the short submarine cable which connects the Isle of White to the main land. The end of this cable is carried in shore along the bank of the river Yar, where it lies covered in the mud. A bull, which had taken it into his head to be fractious, after paying a visit to a chemist's shop, rushed down to the river bank, and there got into the mud just at the place where the cable lands. The animal, in its efforts to extricate itself, struck upon the cable and broke it. The cable, however, was speedily repaired, and is now in proper working order.

THE late thunder storms have done considerable damage to the Postal Telegraphs of the United Kingdom. Demagnetisation of needles, and in a large number of instances the fusing and complete destructions of the instrument coils, shows that the want of an efficient lightning protector is still much felt. Owing to the admirable arrangements of the service, however, little inconvenience will be found to arise from such accidents, to the public in general, although it calls for the most energetic endeavors of the Post-office Telegraph Staff to prevent such inconveniences from arising.

THE Australian Telegraph Company have announced their readiness to receive telegraphic messages for Australia and New Zealand, at the sender's own risk. The land line is not yet complete, but by means of an express service, news may be received in Adelaide five days after London dates. The work of construction in Australia has been divided into two parts, one from Port Darwin southward, the other from Port Augusta northward; of the former 400 miles have been constructed, of the latter 1,176 miles, leaving 250 miles incomplete. Great difficulties have been experienced from floods. If one walks a mile or two from the camp, he may find, on attempting to return, that he is almost cut off by creeks and water courses, which before had no existence. The rainy season would thus seem to threaten interruption to the line when constructed. Iron poles will further be wanted all through tropical Australia, on account of the ravages of the white ant. The company wishes to carry a submarine cable from Port Darwin to join the Queensland lines, in the Gulf of Carpentaria.

THE number of messages forwarded from postal telegraph stations in the United Kingdom, during the week ending July 13, shows an increase of 52,770 messages, as compared with last year.

THE total number of messages forwarded from postal telegraph stations in Great Britain, during the week ending July 20, 1872, was 304,853, an increase on the corresponding week of last year of 57,936.

CORRESPONDENCE.

FOLLOWING COPY.

SAVANNAH, Ga., Aug. 9, 1872.

To the Editor of the Journal of the Telegraph:

It is not my intention to assume an arbitrary position in reference to sense *versus* nonsense, nor do I think my reply to "Buffalo" is open to the inference that the exercise of common sense in matters appertaining to the personal affairs of any individual, should in any manner be prohibited or abridged; but I assume that a company possesses the right to establish regulations and limitations as to the operation of their interests entrusted to any agent employed by it, and that so long as a restriction exists upon the proceedure of that agent, in any direction, it should not be deviated from in any particular. The expediency and judiciousness of the regulation can be discussed with perfect propriety, but a violation of it is neither legitimate nor wise under any circumstances, and if persisted in by the corporate authority which enacted it, the result would be speedy confusion and peril to the interests of that company. The experience of all corporate institutions has demonstrated that where any regulation allows a discrimination in its application, it will invariably result in suppressing the legitimate intent of the enactment, and render it practically inoperative to the accomplishment of its original purpose. The reason is, that any license would naturally result in an indefinite and infinite infringement. While some individuals, possessing judgment sufficient to interpret the proper definition of the license, and a comprehension of the extent required, would use a discriminative privilege with wisdom, justice and moderation, others, by ignorance, recklessness, selfishness, or a disregard of the responsibilities involved, might assume it as a guarantee of their right to exercise their opinions and judgment, whenever and wherever they desired so to do. It thus appears to me, that while the extension of a privilege of personal judgment to those qualified to exercise it, might be of benefit to the company, inasmuch as it is virtually impossible to frame any enactment that will be broad and comprehensive enough to cover all possible cases and contingencies. Yet, the difficulty of ascertaining and measuring the competency of each individual agent, the danger of partial regulations, and the possibility of making unfortunate selections in conferring this privilege, and thereby jeopardizing the interests involved, renders the expediency of a change in the present regulations exceedingly questionable. This requirement of the company from their employés, which it regards as essential to the proper maintainance of their system of business, cannot interfere with the intellectual acquirements or the natural abilities of any one concerned. It is simply that the *principal* restricts his *agent* to a certain line of proceedure which that agent must adhere to, regardless of his individual preferences as to the questions of sense or policy involved.

I have had considerable experience with every description of business entrusted to Telegraph Companies, have seen many peculiar forms of expression, many illegible, obscure and apparently senseless messages, and have also seen many which appeared to resemble an impression taken from the inscription on some ancient monument; but after having satisfied myself that I understood it as the clerk received it from the party sending it, I never considered that I had any right to change it on the supposition that I could improve its orthography or general grammatical construction, because the receiving clerk is presumed to have made all necessary inquiries. If an opinion exists in the mind of the operator that it would be beneficial to have alterations made in a telegram, he can with perfect propriety and sense refer it back to the receiving clerk for his attention, but he should under no circumstances alter or amend any message placed on file for transmission, because he knows nothing of the intentions of the writer—has no basis for judgment beyond his self-created suppositions; and lastly, because the rules of the company employing him, and held responsible for the correct transmission of the message, expressly prohibits it. SAVANNAH.

ATHENS, PA., July 30, 1872.

To the Editor of the Journal of the Telegraph:

How many words are there in the following message?

"Will come up in the morning and bring you statements, *etc.*" "Etc," being the only question upon which there is any doubt; please answer through the JOURNAL. S.

Answer.—Etc, et cetera; two words.

WHITE HAVEN, PA., August 6, 1872.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—Will you please inform me, through the medium of the JOURNAL, the number of words in the following message:

"Your sister-in-law died at half-past five, this P. M. Answer." RUSTIC.

Answer:—Ten words,

LEXINGTON, Ill., July 27, 1872.

To the Editor of the Journal of the Telegraph:

Suppose a message to be left at an office on the morning of 27th July, dated 26th, sender having paid for it and gone, must the message be transmitted as taken, or should an operator correct the date.

Answer:—Operator should, in sending, state that it was filed on the 27th.

ROME, Ga., July 31, 1872.

To the Editor of the Journal of the Telegraph:

Please answer the following question:

A man comes in the office to send a message; said man can't write and requests operator to write it; owing to bad articulation, errors occur in writing message. Who is responsible for such errors? Would it not be best to refuse such request by supplying man with No. 2 blank and let outsider write it. Or are we justified in writing it?

OCCASIONAL.

Answer:—Write the message, but let the customer sign it, or make his mark.

To the Editor of the Journal of the Telegraph:

Suppose I receive a message August 1st, dated San Francisco, July 31st, must I include that message in August Report. Having sent in Report for July!

REGISTER.

Answer:—Yes, with special explanation.

To the Editor of the Journal of the Telegraph:

Can the sender of a "red" message, have it repeated back, upon the payment of one-half of the amount of tolls charged for sending the message.

INQUIRER.

Answer:—Yes.

To the Editor of the Journal of the Telegraph:

By answering the following, you will oblige:

In a message, how many words are "A. M." (meaning forenoon), counted. Please answer through the next number of the JOURNAL. BUSY.

Answer:—One.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory and Province on the Continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

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FOUR DOLLARS FOR FIVE COPIES.

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JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, AUGUST 15, 1872.

NIGHT MESSAGES AT HALF RATES.

It is well known that the bulk of telegraphic correspondence is presented for transmission between the hours of 9. a. m. and 3 p. m., and that for the greater proportion of the twenty-four hours the wires are but partially occupied. In order to utilize the wires during those portions of the day and night, when they were comparatively idle, the Company, in the Spring of 1867 introduced the new feature in telegraphy of offering to transmit messages at night, to be delivered the following morning, at a reduced rate. For this class of business a sliding scale was adopted, 20 words being sent at night at the cost of 10 words by day; 60 words at night at the cost of 20 by day; 120 words at night at the cost of 30 by day, and each additional 100 words at night at the usual cost of a 10 word mesage.

The number of night offices to which messages could be sent at the reduced rates was limited to forty of the principal cities, but such messages could be received for transmission to the above mentioned places at any office, and sent therefrom after 6 o'clock p. m., to the nearest night office on the route to its destination.

The moderate degree of success which attended this limited experiment in the transmission of messages at night at reduced rates, induced the Company to inaugurate a new feature in this service, whereby its benefits might be still further extended through the introduction of a uniform half rate system, and accordingly it was announced that on and after the first day of January, 1870, messages would be received at and for all stations on the Western Union lines in the United States east of the Mississippi river, including St. Louis, for transmission during the night and delivery the next day, at one-half the usual tariff rates, the limits being subsequently extended so as to include all stations on the Montreal, International Ocean and other connecting lines, as well as all Western Union stations in the United States east of Omaha.

Among the chief causes which led to the inauguration of the half rate system, was the constant demands which were made on all sides for additional wires to meet the increasing traffic of the Company, while, at the same time, those already in use were comparatively idle for the greater portion of the night and the earlier hours of the day. It was apparent that the half rate plan, if it should meet with success, must necessarily result in one of two things —the creation and development of an entirely new traffic, or the taking away of a portion of the full rate business which was transacted during the day. If it created a new business which the full day rates failed to reach, it would be performing a good service; while on the other hand, if it secured a portion of the full rate messages, it would relieve the wires during the busy hours of the day, and make room for the transaction of new full rate despatches, and thus prevent, or postpone, the necessity of putting up additional wires for an increased service.

The half rate system proved to be a popular measure from the beginning, and early developed a considerable business. During the past two years it has steadily increased in volume each month, averaging in 1870 about eight per cent., and now amounts to about eleven per cent. of the whole traffic.

Although the half rate business is already very large, we believe it is not so large as it would be, but for the fact that it is not made sufficiently prominent. In many offices there seems to be little effort made to encourage the half rate business, from the mistaken idea that it tends to diminish the receipts. So far from this being true, we believe that a discontinuance or diminution of the half rate system would decrease the receipts of most of our offices. But be this so or not, the policy of the Company is to increase the transmission of messages at night at half rates as largely as possible, until the wires shall be as fully occupied at night as they are during the day. For this purpose every Manager is expected to do all he can to increase this traffic. Placards announcing the fact that messages can be sent at night at half rates should be conspicuously posted in every office, and advertisements conveying similar information should be inclosed in every telegram delivered, so that every man and woman may know that telegrams can be sent over the Western Union wires at night and delivered the next morning at half the usual rates. The Officers of the Western Union Company desire to cheapen the rates of telegraphing as much as is possible, consistent with a due regard to the rights of the stockholders, with a view of popularising and increasing the business, and they believe that the extension of the half rate business is one of the most practicable and efficient modes of accomplishing this result. We hope all employees of the Company will cordially co-operate in forwarding the liberal views of the Company in this matter, and that we shall soon see a material increase in the number of night messages traversing our wires.

Mr. C. H. Foster has been appointed Superintendent of the telegraph lines belonging to the Indianapolis, Bloomington and Western Railway, *vice* T. G. Golden, resigned.

THE TELEGRAPH AND THE PRESIDENTIAL ELECTION.

The free use of the telegraph for the reporting of important speeches to distant localities increases the general interest in our national politics, and tends to bring about a greater uniformity of opinions. For instance, Secretary Boutwell delivers a speech in North Carolina, and the next morning it is reported in full in our morning papers. There is the same promptness in reporting Senator Fenton's speech at Albany. Both are upon the financial issues of the campaign. Both go before the country at about the same time, and present both sides of the case—not to a limited constituency, but to millions of readers. So this morning a long and elaborate speech, made by Carl Schurz last evening, at St. Louis, is reported as fully in our city journals as though it had been delivered at Cooper Institute. To-night Senator Conklin speaks here, and his speech will be read to-morrow by those who heard Senator Schurz last night.

Thus, no matter where or what, or how large the local audience may be, all of the first class efforts of the campaign are really addressed to the readers of newspapers all over the country. The contest loses much of its narrowness by this very fact. A speaker who feels that he is addressing a nation is not so apt to descend below the higher levels of controversy. The arena is too large, and mere local issues and petty personalities sink into their proper insignificance.

The vast constituencies that are now addressed through the aid of the telegraph ought to produce an elevating and enlarging effect on the speakers themselves, while the people, who read first class speeches instead of listning to bitter and commonplace harangues, must be immeasurably benefited by the reading of the able speeches on both sides that are of sufficient importance to be reported by telegraph. They find the question of the day handled with breadth and vigor, and become interested in discussion of the principles of our Government. Only what is strongest and best in the great speeches sinks deeply into the popular consciousness. The froth and scum of debate are transitory and soon forgotten.—*The New York Evening Mail.*

We are in receipt daily of letters on the business of the parties writing, and, as a rule, there is neglect in not inclosing a stamp for return postage. If this occured only once in a while it would not be worthy of remark, but where our average outlay equals twenty-five cents per day for postage upon matters relating to business not our own, it becomes a tax.

We expect, hereafter, in the class of communications here referred to, to find a stamp for return. The accommodation on our part is sufficiently great, when we give our correspondents our time and labor.

Speaking of the North Carolina election in connection with the Western Union office at Raleigh, N. C., the *New York Herald* of 8th inst. says:

"The interest manifested in this election is attested by the marvellous feats of telegraphing performed at this office. From Thursday night to Wednesday morning, intermitting only Sunday, not only were the lines busy with the press, but thousands of messages to individuals were transmitted, keeping Manager Stark and his two assistants at their instruments from noon until daylight the next morning every day since Thursday. The amount of telegraphing for the *Herald* and other New York papers far exceeded all the business ever done at this point for the same length of time, to say nothing of the private business, which has been twice as much more.

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THE WESTERN ELECTRIC MANUFACTURING COMPANY.

Attention is called to the card of Messrs. Gray & Barton, of Chicago, Ill, in our advertising columns, announcing the transfer of their works and business to the Western Electric Manufacturing Company, and to the circular of the new Company, of which Gen. Anson Stager is President. This Company have, in addition to the works of Gray & Barton, purchased the Western Union Telegraph shops at Ottawa, Ill., and have largely increased their manufacturing facilities in addition, and are prepared to carry on the manufacture and sale of telegraph instruments and supplies on an extensive scale. The new Company is probably the largest of its kind in the United States, possessing unsurpassed facilities for accomplishing the vast amount of work heretofore carried on by its predecessors, and which, doubtless, will now be greatly augmented.

THE following statement shows the route of the West India and South American Telegraphs connecting with the International Ocean Lines at Havana:

From	*To*	*Miles.*	
Havana	Batabano, Cuba	42	land
Batabano	St. Jago de Cuba	560	cable
St. Jago de Cuba	Holland Bay, Jamaica	120	"
Holland Bay	Morant Bay, "	15	land
Morant Bay	Kingston, "	35	"
Holland Bay	Aspinwall, U. S. C.	600	cable
" "	San Juan, Porto Rico	650	"
San Juan, Porto Rico	Charlottenb'g, St. Thomas	65	"
Charlottenb'g, St. Thomas	Basse Terre, St. Kitts	170	"
Basse Terre, St. Kitts	St. John, Antigua	60	"
St. John, Antigua	Basse Terre, Guadaloupe	80	"
Basse Terre, Guadaloupe	Roseau, Dominica	60	"
Roseau, Dominica	St. Pierre, Martinique	45	"
St. Pierre, Martinique	Port Castries, St. Lucia	55	"
Port Castries, St. Lucia	Kingston, St. Vincent	60	"
Kingston, St. Vincent	Bridgetown, Barbadoes	120	"
" "	St. George, Grenada	95	"
St. George, Grenada	Macaripe Bay, Trinidad	95	"
Macaripe Bay, Trinidad	Port Spain, "	18	land
Port Spain, Trinidad	Moruga Point, "	50	"
Moruga Point	Georgetown, Demerara	300	cable
Georgetown, Demerara	Berbice, or New Amsterdam		
Total number of miles		3,295	

Arrangements are being made to carry on the line to Surinam and Cayenne.

Sir Chas. T. Bright is now engaged in laying cable between Jamaica and Aspinwall.

WE are in receipt of a communication from S. R. Jones, Lancaster, Pa. From what we gather in reading it, (and it is not very clear), we should advise Mr. Jones to patent his invention and then sell it. If it is of any real value he will have no difficulty in disposing of it.

BORN.

HOTZ.—At Lancaster, Pa., to Jacob Hotz, a daughter.

MARRIED.

DAVIS—BOSH.—At Sharon, Pa., June 11, 1872, by Rev. Henry Camp, J. C. Davis, Manager W. U. Telegraph office, Girard, Ohio, to Miss Jennie Bosh, of Girard.

DIED.

DORMAN.—At Stafford Springs, Conn., July 13, 1872, Carrie E. Dorman, aged 19 years and 2 months.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
August 15, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since August 1, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff books as soon after the receipt of the JOURNAL *as possible:*

NEW OFFICES.

437 Atchison Junction, Mo.	233 Ludlow Grove, O.
25 Brookfield, Mass.	* Lowell, Neb.
21 Braintree, Mass.	* Lake Mohonk, N. Y.
18 Bristol Ferry, R. I.	41 Menlo Park, N. J.
305 Canoe Station, Ala.	21 Marshfield, Mass.
226 Conyers, Ga.	* Mooresville, N. Y.
18 East Stoughton, Mass.	18 North Abington, Mass.
327 Ellsworth, Ill.	36 North Hoosick, N. Y.
29 East Hampton, L. I. N. Y., re-opened.	10 Orono, Me., check Bangor, Me.
29 East Lyme, Conn.	18 Plympton, Mass.
242 Franklin, Warren Co., O.	130 Pioneer., Pa., re-opened.
41 Godwinville, N. J., re-opened.	21 Scituate, Mass.
102 Howard, Centre Co., Pa.	331 Saltillo, Miss., re-opened.
18 Holbrook, Mass.	427 Spickards, Mo.
18 Hanson, Mass.	481 Trinity, Texas.
25 Indian Point, R. I.	347 Tremont, Ill.
67 Kirkwood, Del., re-op'n'd	272 Velonia, Ind., re-opened.
	103 Weaverton, Md., re-open'd.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.		*Leaves this Line.*
Lake Mohonk, N. Y.	25	2	New Paltz, N. Y.
Lowell, Neb.	165	11	Plattsmouth, Neb.
Mooresville, N. Y.	45	3	Rondout, N. Y.

OFFICES CLOSED.

Beattie, Ks.; Edgerton, Mo.; Chehaw, Ala.; Essex, N. Y.; Goodmans, Fla.; Greensboro, Ga.; Laurel, Del.; Marianna, Ark.; Maywood, Ill.; Mannington, W. Va.; Norwood, N. J., Wetumpka, Ala., and Westover, Md.

GENERAL INFORMATION.

The following is a revised list of offices on the Chesapeake and Ohio R. R. Line, with "tariff for other Lines" from Greenbrier, White Sulphur Springs, and Huntington, W. Va.

Bowyer's Ferry, W. Va.	60	4 Greenbrier, W.S. Spg's, W.Va.
	65	4 Huntington, "
Big Bend Tunnell "	40	3 Greenbrier, W.S.Sp'gs, W.Va.
	65	4 Huntington, "
Barboursville, "	65	4 Greenbriar, W.S.Spg's, W.Va.
	35	2 Huntington, "
Coalburg, "	65	4 Greenbrier, W.S.Spg's, W.Va.
	50	3 Huntington, "
Charleston, Kanawha Co. W.Va.	65	4 Greenbrier, W.S.Spg's, W.Va.
	50	3 Huntington, "
Hurricane, "	65	4 Greenbrier, W.S.Spg's, W.Va.
	40	3 Huntington, "
Kanawha Falls "	65	4 Greenbrier, W.S.Spg's, W.Va.
	60	4 Huntington, "
Miller's Ferry "	60	4 Greenbrier, W.S. Spgs, W.Va.
	60	4 Huntington, "
New Richmond, "	50	3 Greenbrier, W.S.Sp'gs, W.Va.
	65	4 Huntington, "
Stretcher's Neck, Tunnell. W.Va.	50	3 Greenbrier, W.S.Sp'gs. W.Va.
	65	4 Huntington, "
St. Albans, "	65	4 Greenbrier, W.S.Sp'gs, W.Va.
	40	3 Huntington, "

Business for offices on B., N. Y. and P. R. R. line named in last JOURNAL may be sent via Olean, N. Y., if more direct than via Buffalo, N. Y., "tariff for Other Lines," as follows:

Arcade, N. Y.	25	2	Olean, N. Y.
Elma, N. Y	40	3	do
East Aurora, N. Y.	40	3	do
Eldred, Pa.	25	2	do
Franklinville, N. Y.	25	2	do
Holland, N. Y.	35	2	do
Ischua, N. Y.	20	2	do
Larabees, Pa.	25	2	do
Machias, N. Y	25	2	do
Port Alleghany, Pa.	25	2	do
Protection, N. Y.	30	2	do
South Wales, N. Y.	35	2	do
Yorkshire Centre, N. Y.	25	2	do

Eidred, Larabees, and Port Alleghany, Pa., were incorrectly given in last JOURNAL, as in New York.

The name of the office heretofore known as Hillsburg, N. S., has been changed to Bear River, N. S., and 120, Pine Grove Warren county, Pa., has been changed to Russellburg, Pa.

The tariff to East Hampton, L. I., N. Y., from offices in squares 1 to 40, inclusive, and 45 and 46, will be 15 cents more than tariff to square 41.

Hereafter business for Falconers, N. Y., will be checked to Jamestown, N. Y., and for Sugar Notch, Pa., to Wilkesbarre, Pa.

The P. O. address of Moselem, Pa., is Nora, Berks County, Pa., and of East Lyme, Conn., is Niantic, Conn.

Newport, Ky., is a W. Union office, tariff same as Cincinnati, and should be checked direct. See JOURNAL of May 1, 1872.

WILLIAM ORTON,
President.

TELEGRAPHERS' INSURANCE ASSOCIATION.

The acknowledgment of receipt on any one assessment is to be understood as an acknowledgement for all previous assessments.

Assessment No. 31.

5	8	17	27	30	31	39	41	55	58	75
111	114	122	136	138	139	171	182	232	239	246
248	256	267	288	319	327	328	342	360	361	376
402	428	429	438	447	454	476	478	482	483	484
494	495	496	497	499	500	503	504	505	511	512
561	566	587	597	628	659	660	690	698	701	702
710	711	804	809	904	905	906	911	923	977	978
991	992	1002	1011	1029	1030	1031	1032	1033	1034	1038
1050	1059	1069	1101	1103	1104	1139	1142	1152	1163	1180
1187	1193	1194	1195	1205	1218	1242	1262	1290	1323	1328
1335	1338	1339	1340	1341	1342	1343	1344	1345	1346	1348
1349	1350	1351	1352	1366	1367	1371	1375	1378	1380	1383
1396	1402	1403	1404	1408	1410	1427	1452	1479	1483	1485
1486	1490	1497	1510	1515	1516	1519	1520	1546	1547	1548
1552	1564	1576	1577	1582	1593	1594	1596			

MAGNETISM.

The French Academy of Sciences has received a paper from M. J. Jamin, in which he shows that magetism may be condensed, just like electricity. Having, for some special purposes, had a large horse-shoe magnet made, consisting of ten laminæ of perfectly homogeneous steel, each weighing ten kilogrammes, he suspended it to a hook attached to a strong beam, and, having wound copper wire around each of the legs, which were turned downwards, he put the latter into communication with a battery of fifty of Bunsen's elements, by which means the horse-shoe might be magnetized either positively or negatively, at pleasure. The variations were indicated by a small horizontal needle, situated in the plane of the poles. There was, further, a series of iron plates, which could be separately applied to each of the laminæ. Before attaching any of the latter, the electric current was driven through the apparatus for a few minutes, and then interrupted, whereby the magnet acquired its first degree of saturation, marked by a certain deviation of the needle. One of the iron plates (usually called "contacts") was then put on, and it supported a weight of 140 kilogrammes. A second trial was now made; and the current having passed through again for a few seconds, it was found that the horse-shoe would support 300 kilogrammes, instead of 140. The number of contacts being now increased to five, which together, in the natural state, supported 120 kilogrammes, it was found, after the passage of the current, that they could support the enormous weight of 680 kilogrammes, which they did for the space of a full week. No sooner, however, were the contacts taken off than the horse-shoe returned to its usual permanent strength of 140 kilogrammes. This leads to show that magnetism may be condensed like electricity for a short period.

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DISPERSION OF ELECTRICITY IN GASES.

The gradual loss of electricity by charged conductors, supported by solid insulators, and surrounded by air, is due, according to Coulomb, to two causes: first, the imperfect insolating power of the supports, and second, the action of the atmosphere, inasmuch as the small particles that are in contact with the conductor are electrified and driven away, giving place to fresh unelectrified particles, which are influenced in their turn similarly.

Coulomb found that charges which did not exceed a certain limit of electric density were perfectly insulated by the better insulators; this limit varied according to the insulating power of the substance used. For lower densities, the loss of electricity took place only by the atmosphere; and he found that the time in which the charge was reduced to an aliquot part of its amount has a constant value.

If Q denote the quantity of electricity in the conductor at time t, and Q_0 the quantity at the commencement, then

$$Q = Q_0 e^{-\frac{1}{2p}t}$$

where e is the base of a logarithmic system, and $2p$ is the time in which a charge Q is reduced to $\frac{1}{e}$ Q. According to Riess—$\frac{1}{p}$ is smaller in proportion to the quantity of electricity in the enclosed air of the balance employed.

Dellman experimented with moist air, and Matteucci with various dry gases—carbonic acid, air, and hydrogen. According to the latter, the loss is the same in all gases.

Professor Warburg prosecutes the subject in a recent paper in Poggendorff's "Annalen." The experiments he describes were conducted according to Coulomb's method, in which, the diminution in repellent force between two metallic discs kept at constant distance in a tension balance indicated the loss of electricity.

The results arrived at are briefly these:—

1. The loss of electricity from a charged body by its insulating support is greater the further this insulator is from a certain state of electrification into which it is brought; but the loss gradually approaches a small constant value, which it takes many hours to reach.

If the insulator be regarded as a bad conductor, then, where the difference in potential is great, there is a considerable escape of electricity in the insulator; where the difference is small (the insulator having reached the electrical state referred to), the escape is small. Experiments on the dispersion of electricity in gases ought therefore only to be made when the insulating supports have come to this fixed state.

For shellac cylinders, 1 m.m. diameter and 20 m.m. length, to which are attached metallic discs, 17 m.m. diameter, the loss by the supports, if these are little or not at all electrified, is large in comparison with the loss by air, while it is small in the opposite case. Thus the loss from both sources may be separated and measured.

2. The dispersion of electricity in gases proceeds according to Coulomb's law already stated.

3. The dispersion is found to be nearly the same in dry carbonic acid and atmospheric air; in hydrogen, only about half as great as in these gases.

4. The co-efficient of dispersion is considerably reduced on a reduction of the pressure from 760 m.m. to 380 m.m.; and at 70 m.m. pressure (in air) it is only one-third as great as 760 m.m.

5. Moist air does not give a much greater dispersion than dry air.

6. The dispersion of positive electricity, and that of negative, takes place at same rate.

DEEP SEA SOUNDINGS BY ELECTRICITY.

A correspondent of the *Scientific American* writes as follows:

The want of a means by which the depth of water at sea for soundings may be obtained expeditiously, certainly, and without stopping the vessel's way, howsoever fast she may be going through the water, has been long felt by seamen. Doubtless many disasters, resulting in the loss of vessels, lives and cargoes, might have been averted had the captain taken the precaution of frequently sounding, but when running "on time," the delay of getting a fair "up and down" cast is often too great, and captains prefer to, and often do risk getting into shoal water rather than lose the time required to sound. Of all the contrivances now in use, so far as known, to obviate the difficulty, probably Massey's patent is the best, but even that is defective and liable to error.

Fortunately, by the aid of electricity, a ship running along a coast at night, or approaching the land in thick weather, may, without "luffing to" or "slowing down," keep constantly sounding and obtaining the depth of water with rapidity and precision. Indeed, should the vessel suddenly strike shoal water, the fact is made known the instant the lead touches the bottom, without waiting to haul it in.

It is known by experiment that a lead of a determined shape and weight, with its line attached, will sink in sea water at a certain rate per second. On getting a cast of the lead, then, it is only necessary to ascertain the time the lead takes to reach the bottom in order to know the depth of water.

This is accomplished as follows: The lead line contains a heart composed of two insulated copper wires. The inboard end is connected with a small battery, and, by means of an armature, with a clock. The other end is bent to the lead.

The lead contains two insulated copper wires passing through its length, the upper ends connecting with those of the line. The lower ends, tipped with platinum, are slightly exposed beyond the surface of a false bottom or upper section of the lead. The lower section of the lead acts as a plunger, with a play of about one-eighth of an inch.

On striking the bottom the plunger is thrown up, so that a "button" on its upper surface comes in contact with the two platinum points, thus closing the circuit. This is known on deck by the instantaneous stoppage of the second hand of a clock, and the sounding of a gong attached to the clock, the purpose of the gong being to call attention.

The clock is an ordinary time-piece, with the addition of a second hand pivoting at the centre, and long enough to reach the perimeter of the face, where are marked the fathoms corresponding to the minutes.

Let it be supposed, for example, that a ship running along the coast at night should, at a certain hour, be, by the chart, in forty fathoms of water. The captain orders a cast of the lead and about forty fathoms of line to be used, the lead weighing say fifty pounds. At the instant of heaving the lead the second hand is set in motion and commences its regular beats; but instead of passing on to seventeen seconds, which is seen, on the face of the clock, to correspond to forty fathoms, the gong suddenly strikes its warning, and the hand is arrested at four seconds, which is seen to correspond to ten fathoms; the captain is thus warned of his dangerous proximity to shoal water, and at once hauls off.

A reel fitted in some convenient place aft should be used for reeling in the line and for keeping it in good order. The battery used is simple and inexpensive, and will keep in good working order for eight or nine months, and the clock, gong, and battery may all be contained in a case not larger than an ordinary ship's binnacle.

Connected with the same, battery wires may be led throughout a ship for signal purposes, such as for communicating with the man at the wheel, with the engine room, &c., &c., though if the wires be greatly multiplied, the strength of the battery must be increased in proportion.

POWERFUL GALVANIC BATTERY.

Mr. H. Highton communicates the following to the *Mechanics' Magazine*:

It may interest your readers to know that the cheap and simple battery made up as follows is nearly 50 per cent. higher in its potential than a Grove battery, and more than 150 per cent. higher than a Daniell:—

For positive, zinc in a solution of caustic potash or soda; for negative, carbon in a porous cell packed with precipitated sulphur, peroxide of manganese and granulated carbon, filled up with dilute sulphuric acid. The internal resistance is rather great, but if common salt be used with the zinc the internal resistance is much less, but the potential only a little more than 10 per cent. higher than a Grove.

This is a very cheap and convenient form of battery, and, I think, on the whole, the very best that can be used for ordinary purposes.

NEY'S BATTERY.

This cheap and convenient battery is constructed as follows: It consists, in the first place, of a glass vessel, filled with a solution of sal-ammoniac; then of an amalgamated zinc plate, which dips into the vessel. Further, of a porous cylinder of clay, standing in the same vessel, and filled with carbonate of copper, in which a plate of copper is suspended. For field and telegraph purposes, it is well to fill the glass vessel with fine sand, saturated with sal-ammoniac solution, instead of the pure solution itself. It is only necessary to add the crystal sal-ammoniac from time to time, in order to keep this battery in constant activity. The carbonate of copper is itself insoluble in the sal-ammoniac solution; but under the influence of the galvanic current, the sal-ammoniac is separated into the hydro-chloric acid and ammonia, the first of which attaches itself to the zinc, and the latter to the salt of copper, and dissolves it. During the reduction, a secondary current is produced, which is equivalent in strength to that of a Daniel's battery.

PERIODICITY OF STORMS.—M. Charles Sainte-Claire Deville read not long since a memoir before the *Academie des Sciences*, on quadruple symmetries and their application to the study of electric and atmospheric phenomena. He brought forward evidence to show that storms, auroras, etc., almost always occur after periodic intervals of ninety, thirty, and ten days. Also that there is a periodicity attached to the thirteenth, fourteenth, and fifteenth days of the month, as shown by the reports of the Meteorological Office. During the last two years, two or more of the days of from the 11th to the 15th of every month have been marked by winds, rain, squalls, thunder storms and auroras. Furthermore, a symmetry of phenomena can be detected at the dates 4th, 13th, and 24th of each month, of which M. Deville cited numerous examples.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 19. NEW YORK, SEPTEMBER 2, 1872. WHOLE NO. 116.

SIEMENS UNIVERSAL GALVANOMETER

The Siemens Universal Galvanometer, as its name would imply, is intended to meet all the requirements of a measurer of electric forces and resistances. The instrument consists of a comparatively sensitive galvanometer, which can be turned in a horizontal plane, combined with a Wheatstone Bridge and three resistance coils of 10, 100 and 1000 units respectively.

For measuring the strength of a current, the instrument is used as a sine galvanometer. For making measurement of electromotive forces, Professor E. du Bois-Reymond's modification of Poggendorff's compensation method is employed. For measuring conducting resistances, the instrument is used as a Wheatstone's Bridge.

The unit of measurement employed with this instrument is the Siemens mercury unit, representing the resistance of a prism of pure mercury one metre long and one square millimetre section, at 0° C. The ohm is equal to the resistance of a prism of pure mercury 1.0486 metres long and one square millimetre section, at 0° C. One Siemens unit—.9530 ohms.

Figure 1 shows a plan, and figure 2 an elevation, of the instrument.

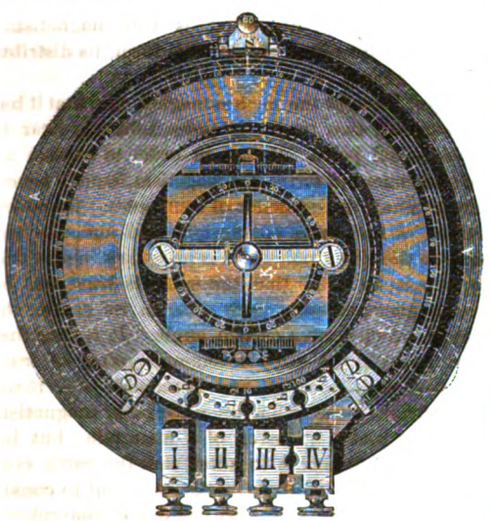


Figure 1.

A is a circular plate of polished wood, supported upon three levelling screws, *b b b*.

In the centre of A a metal boss is inserted, in which turns the vertical pin a, which carries the instrument. This pin, being well fitted to the boss, supports the instrument firmly, but at the same time allows it to be turned freely round its vertical axis without losing its horizontal position when once this has been obtained.

To the pin *a*, is attached a circular disc of polished wood C, about one inch thick, and having a groove turned in its edge for the reception of the insulated wires composing the artificial resistances. The disc C has a projection *c*, which carries the four insulated terminals marked I., II., III., IV., as shown on fig. 1.

The terminals marked III. and IV., can be connected together by means of a plug.

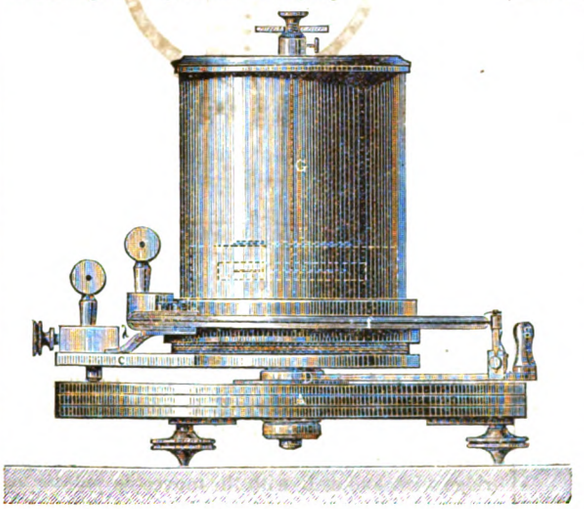


Figure 2.

Over C rests a somewhat larger disc of slate, the greater part of the circumference of which is turned to a true circular curve, but the part of this disc which is immediately above the projection c, on the lower disc, is cut out so as to leave a gap.

This slate disc carries in its centre the galvanometer G, and in front of it, along the gap, four insulated terminals, h_1 h_2 h_3 h_4, which may be connected with each other by means of plugs, and to the ends of which the wires of the artificial resistances are connected, as shown in fig. 3.

The galvanometer offers nothing extraordinary in its arrangement. It has an astatic needle system suspended from a cocoon fibre and a flat bobbin frame, wound with fine wire. The needle swings above a cardboard dial divided into degrees; as, however, when using this instrument the deflection of the needle is never read off, but the needle instead always brought to zero, two ivory limiting pins are placed at about 20 degrees on each side of zero.

The cocoon fibre is fastened to the knob K. One end of the convolutions of the galvanometer wire is connected to terminal h_1, on the slate disc, and the other end is terminal IV., as shown in the accompanying diagrams.

A slight groove is turned in the edge of the slate disc, and in this a tightly stretched wire made of platinum or German silver is inserted in such a manner that about half its diameter protrudes beyond the slate. The ends of the wire are soldered to two brass plates *l* and l_1, which are placed at the angles formed by the sides of the gap in the slate disc. The plate *l* is permanently connected by a thick copper wire or metal strip to terminal h_1, and the other plate l_1 is connected in a similar manner to terminal III.

Slate is adopted for the material of which to make the disc *f*, because it is found by experience to be the material which is least sensitive to variations in the weather or temperature. The slate disc is graduated on its upper edge through an arc of 300 degrees, zero being in the centre, and the graduations figured up to 150 on each side at the terminals *l* and l_1 of the bridge wire.

On the arm D, which turns on the pin *a*, and somewhat behind the handle *g*, there is a small upright brass arm *d* turning between two screw points *r*, and carrying in a gap at its upper end a small platinum jockey pulley *e*, turning on a vertical axis. This pulley forms the movable contact point along the bridge wire, against which it is kept firmly pressed by means of a spring acting on the arm *d*. The arm D, which is insulated from the other parts of the apparatus, is permanently connected with the terminal I. On the top of *d*, a pointer Z or a vernier is fixed, which laps over the upper edge of the slate disc and points to the graduations.

Figure 3 represents the connections to be made when using the instrument as a Wheatstone bridge for measuring conducting resistances.

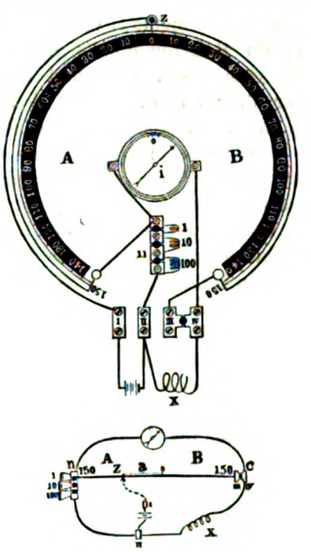


Figure 3.

The needle *i* is to be brought to the zero point of the scale by turning the galvanometer G round its vertical axis. The pointer or vernier Z is to be brought by means of the handle *g*, to the zero point of the large scale on the slate disc. A plug is to be inserted between the terminals marked III. and IV.. Two of the holes marked 10, 100 and 1000 are to be plugged and one left open, according to the extent of the resistance to be measured. 10 or 100 must be left open if the resistance is small, and 1000 if it is large. The two ends of the wire, helix or other unknown resistance to be measured are to be connected to terminals II, and IV. Connect the + pole of a battery with terminal I. and the — pole with II.

The lower diagram of fig. 3 represents the modifi-

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cation of the Wheatstone bridge which is employed in this instrument. The proportion between the unknown resistance X and the artificial resistance n, when the deflection is read off on the side of the slate disc marked A, is as follows:

$$X : n = 150+a : 150-a \text{ or, } X = \frac{150+a}{150-a} \times n.$$

When read off on the B side of the disc

$$X = \frac{150-a}{150+a} \times n.$$

When the connections have been made with the instrument as shown in figure 3, the needle i may be found to deflect to the right hand or B side of the instrument, and the pointer or vernier Z may then be pushed by means of the handle g also to the B side of the instrument until the needle is brought to zero; or if by moving the vernier to the B side, the deflection of the needle is increased, the pointer Z should be pushed to the other or A side of the instrument beyond the zero point of the large scale and until the needle is brought to the zero point of the small scale. If when this is done the pointer Z stands at 50° on the A side of the large scale and at the same time at n the plug is out which puts the 100 units of artificial resistance into circuit, the following proportion will be obtained:

$$150-50 : 150+50 = n : X$$

$$X = \frac{200 \times 100}{100} = 200 \text{ units.}$$

If the needle is brought to the zero point of the small scale, while the pointer Z stands at 50° on the B side of the large scale, and the 100 unit resistance plug is removed, the following porportion will be obtained:

$$150+50 : 150-50 = n : X,$$

$$X = \frac{100 \times 100}{200} = 50. \text{ units.}$$

For making measurements of electromotive forces, Professor E. du Bois-Reymond's modification of Poggendorff's compensation method is employed.

The upper diagram of figure 4 shows the connections to be made with the instrument. The needle i is to be brought to the zero point of the small scale by turning the galvanometer G round its vertical axis. The pointer, or vernier, Z is to be brought by means of the handle g to the zero point of the large scale on the slate disc. The hole between III. and IV. to be left unplugged. Plugs to be inserted in 10, 100 and 1000. The two poles of the battery E_0 (which must be greater than E_1 and E_2) are to be connected with the terminals II. and III. The poles of the battery which is to be compared to E_0 are to be connected to terminals I. and IV. in such a manner that the similar poles of the two batteries are joined to terminals I. and III. and to II. and IV. respectively.

The galvanometer needle will now be deflected, and can be brought back to zero by turning the pointer Z either to the right or the left. Should for instance the pointer have to be brought to 30° on the A side, we have the following equation:

$$E_1 = E_0 \frac{150-30}{300+u} \text{------(1),}$$

where u is the resistance of the battery E_0.

The battery E_2 is now to be inserted in the place of E_1, and the galvanometer needle, when it deflects again, brought back to zero by moving the pointer Z. If for instance the pointer has to be pushed to 40° on the B side to obtain an equilibrium, we have:

$$E_2 = E_0 \frac{150+40}{300+u} \text{------(2.)}$$

By eliminating u from equations 1 and 2 we have:

$$E_1 : E_2 = (150-30) : (150+40) = 12 : 19 \text{------(3.)}$$

The two electromotive forces are in the same proportion as the two observed distances of the pointer Z from 150° on the A side of the instrument.

The lower diagram of figure 4 shows the arrangements of the circuits for comparing the electromotive forces by this method. The more powerful battery E_0 is connected at II. with one end of the resistance coils n, and at III. with

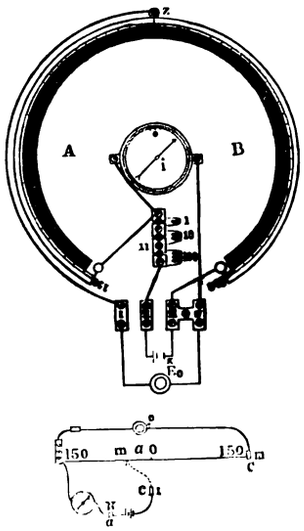


Figure 4.

the other end of the resistance coil, through the bridge wire. The battery E is connected at IV with one of the termini of the galvanometer coil, whose other end is connected with one end of the bridge wire, and at I. with the moveable pointer, or vernier, Z. The current from E_0 enters the resistance coils at II. and passes through them to the bridge wire, where two paths are open for its return—one *via* the bridge wire direct and the other through the galvanometer, the battery E and the vernier Z to

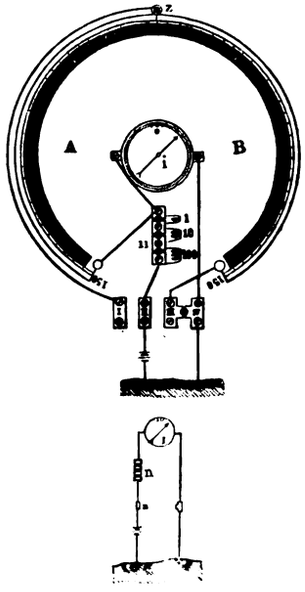


Figure 5.

the bridge wire. The current from E enters the bridge wire near the resistance coils n and traverses the former until it reaches the pointer Z, whence it returns. By moving the pointer until the tension is the same at IV. as it is at the junction of the bridge wire and the resistance coils n, no current will flow through the galvanometer.

For measuring the strength of a current, or the quantity which is passing over a conductor, the instrument is used as a sine galvanometer. Figure 5 shows the connection of the wires for this purpose.

The needle i is to be brought to the zero point of the small card-board scale by turning the galvanometer G round its vertical axis. The pointer, or vernier, Z is to be brought, by means of the handle g, to the zero point of the large scale on the slate disc. The hole between III. and IV. to be left unplugged. Plugs to be inserted in 10, 100 and 1000. Connect one pole of a battery to terminal II. and put the other pole to earth. Connect the line to terminal IV. The galvanometer is then to be turned in the same direction as the needle is deflected until the needle coincides with the zero point. Whilst this is being done the large scale on the slate disc will move under the pointer Z, which must be left stationery; the sine of the angle pointed by Z will then give the value proportionate to the strength of the current.

TERRESTRIAL MAGNETISM.

The magnetic force of our globe is manifested at its surface by three classes of phenomena; namely, the *declination* of the magnatized needle, its *inclination*, and the *intensity* with which the force acts. The declination is the angle that is formed with the direction of the meridian of the place by the direction of the magnetized needle placed upon a vertical pivot. The inclination is the angle that is formed with the horizon in the magnetic meridian by the direction of a magnetized needle sustained by its centre of gravity, around which it is able to turn freely in a vertical plane. These three elements, declination, inclin tion, and intensity, vary not only from one place to another, but in the same place, with time. They also manifest irregular and accidental variations, designated under the name of *disturbances*, and the existence of which is connected with some natural phenomenon, such, in particular, as that of the aurora borealis.

It is well established that the forces which act upon the magnetized needle emanate directly from the terrestrial globe. But what is this magnetism? Where does it reside? What is its form, its distribution, its origin?

Gilbert thought the earth a magnet, and that it has consequently two magnetic poles, tolerably near to its terrestrial poles. Halley, in order to explain all the phenomena of terrestrial magetism, found it necessary to admit the existence of four poles. Hansteen arrived at the same conclusion, and assigned the place to these four poles. It is necessary, under this hypothesis, to admit that the earth is traversed by two magnets, crossing each other in its centre, the axes of which form a certain angle. It is true that there exists in the earth a magnetic oxide of iron, endowed with polarity, and Humboldt has made some curious observations upon the polar magnetism of certain rocks, and even of a mountain; but besides our being unable to admit that the earth contains a quantity of these rocks sufficient to constitute terrestrial magnetism, we could not comprehend to what would be due the regular distribution which their magnetic polarity would assume. Gauss considers that the whole mass of the globe is magnetic, and that there exist a great number of magnetic centres.

Mr. Barlow, after having demonstrated that neither the presence of a single magnet, nor the arrangement of several magnets in the interior of the globe, could produce the phenomena of terrestrial magnetism, considers that, on the contrary, we may very well account for them by assuming, as Ampère did, *electric currents*, circulating around the terrestrial globe in a direction very nearly from east to west. He has endeavored to confirm this hypothesis by distributing upon the surface of a wooden globe a series of electric currents, arranged so as to produce upon a magnetic needle, not subject to terrestrial influence, and

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placed in divers positions, the same kind of action that the earth imparts to it in analogous positions.

De la Rive considers that the forces which produce terrestrial magnetism have their origin in the solidified portion, that is, in the solid crust of the terrestrial globe, which does not prevent the points of application of their resultants being in the interior of the globe, more or less near to its centre; and hence the idea of electric currents circulating in this solid envelopo, and forming a solenoid more or less complicated, appears to him most natural. But whence arise these currents, and what is the cause by which their direction is determined? In order to explain atmospheric electricity, a production of electricity is assumed, resulting from chemical actions which take place in the interior of the terrestrial globe; but we cannot comprehend how this development of electricity should give rise to currents circulating from east to west. This direction must evidently be connected with the movement of rotation of the earth, which takes place from west to east; and consequently it is only in the existence of *induced currents*, arising from a magnetic action exterior to the earth, but susceptible of being exercised upon it, that the confirmation may be found of the hypothesis of Ampère, adopted by Mr. Barlow.

Indeed, the inductive currents are connected, more or less, according to their direction, with the direction of the movement of the induced body; and we know that on causing a body to rotate rapidly on its axis, under the influence of a magnetic pole, we are able to produce in it continuous induced currents. But where would the inducing body be, when the terrestrial sphere is in question? Evidently, it could only be found in the moon or in the sun. The moon plainly exercises an influence over the movements of the magnetized needle; but this influence is very feeble, and nothing enables us to discover traces of magnetism or of dynamic electricity in the moon, the mass of which, besides, is too small in respect to the earth for us to suppose that it can act upon it. It would be much more likely that the earth should act upon the moon.

It is only in the sun that we can find a body exterior to the earth capable of exercising upon it an inductive action. The sun appears to possess powerful electro-dynamic proprieties, for it is very probable that its light is due to energetic electric currents, which surround it, from the fact that the electric light, which plays between two carbon points that communicate with the two poles of a battery, bears a stronger resemblance to it than any other.

That the magnetic influence of the sun is not a gratuitous hypothesis, we find a proof in the agreement that exists between the magnetic movements upon the surface of the earth and the various positions of the sun in respect to the places of observation. Endeavors have been made to explain this agreement by an indirect action of the sun. M. Aimé attributed the diurnal variations of the magnetic elements to thermo-electric currents, all emanating from the most heated point,—a point which, changing its place with the sun, must make the turn of the globe in twenty-four hours; so that, in every place on the earth, except upon the parallel in which is the centre of the action, the direction and the force of the currents change throughout the day. But this hypothesis has against it, independently of a general objection, the small probability of the existence of thermo-electric currents upon the surface of the earth, either on account of the imperfect conductibility of this surface, or on account of the enormous proportion of water that it presents, which is not susceptible of thermo-electricity.

Faraday attributes the magnetic variations to the magnetic properties of the oxygen of the atmosphere,—properties which follow, in their degrees of force, the variations of temperature, in such a manner that heating reduces and cooling exalts them.

Father Secchi concludes from all the phases which the variation of declination undergoes, that *the sun acts upon the magnetized needle as if it were itself a large magnet, placed at a great distance from the earth, and having its poles of the same name as those of the earth turned to the same side of the heavens.* But in order to recognize the accuracy of these laws, regard must be had to the inverse action which the needle undergoes on the part of the sun in the twenty-four hours, by the effect of the rotation of the earth, the front of the needle that faces the sun being different at noon and at midnight, and the earth being interposed at the second epoch.

There are, however, other causes which affect the magnetized needle. M. Arago observed, on February 19, 1822, an extraordinary agitation in the needle of diurnal variations, and there was at the same moment a strong earthquake in Auvergne, at Lyons, and in Switzerland. Mr. Gray likewise observed in Valdivia, on the western coast of South America, a very remarkable disturbance in the magnetized needle at the period of a terrible earthquake which took place in those latitudes in February, 1836. But among all natural phenomena, there is one whose connection with terrestrial magnetism is so well established that we have, in the movement which the magnetized needle suffers, a proof of its presence, namely, the aurora borealis.

DURATION OF ELECTRIC SPARK.

Two methods have hitherto been employed in the determination of this. One is that of Wheatstone, in which a small mirror is made to rotate at a high velocity round an axis in its own plane, and the image of a spark is observed in it. In this way the discharges from batteries have been made to give images elongated in the direction of rotation; showing a sensible duration in the spark. By measuring the elongation and the velocity of rotation, the duration may be ascertained.

The other method is that of Arago, in which a disc with white sectors on a dark ground is made to rotate about an axis perpendicular to its plane, and the enlargement of the sectors in the light of the spark affords a means of determining the duration of the latter.

MM. Lucas and Cazin recently described to the Paris Academy a method which gives somewhat more precise results, and on which a Committee of the Academy have reported favorably.

They employ a moveable disc, (made of plates of mica), the rim of which is situated between the observer's eye and the spark. On the rim are traced very fine lines, transparent and equidistant, and which are obtained by photographic reproduction. This disc is placed before a second opaque disc of the same diameter, which is fixed, and has on its rim seven fine lines, comprising six divisions, with a width which is equal to five divisions of the moveable disc, so that this second disc forms a vernier, by which the one-sixth of a division of the first disc may be estimated.

The spark appears in the focus of the lens of a collimator, which gives the rays (passing to the vernier) a direction parallel to the axis of rotation of the moveable disc. On the opposite side of the discs a small telescope is placed for observation of the luminous effects.

If the spark has an inappreciable duration, the observer may either see a bright line, or he may not. In the former case, the spark appears at the moment of coincidence of a line on the moveable disc with one on the fixed disc; in the latter case, the spark appears between two coincidences. There is, however a certain probability of coincidence of lines and spark, depending on the breadth of the lines on the discs, and also the number of those on the vernier. This has been determined experimentally for the apparatus now considered, equal to 0.70; *i. e.*, that if an instantaneous spark be produced at any instant, then, out of 100 instances it will give a bright light 70 times, while 30 times it will give none.

Suppose, now, the duration of a spark is a little greater than that of the passage of a line on the moveable disc before two lines on the vernier, then, if the commencement of the spark happens at the instant of the first coincidence, the bright line from this coincidence will (owing to persistence of impression on the retina) continue visible at the time of the second coincidence, and two lines will thus be seen at once.

If, with the same duration, the spark commences between two coincidences, it will have ceased when the third arrives. And thus there will only be one bright line, that from the second coincidence. In this way (as the Committee point out) there may be either one or two bright lines for the same duration of spark. But if the duration of the spark be greater than that now spoken of, it will be comprised between two numbers that are easily determined, the difference of which is equal to the time elapsing between two successive coincidences. A very close approximation may be arrived at, and the inventors of the method show that, in virtue of the above mentioned probability of coincidence, by noting the total number of lines observed from a given number of sparks, and the velocity of rotation, the duration of the spark may be pretty accurately determined.

We cannot see at the same time more than a limited number of coincidence lines, so that if they exceed five or six, the velocity of rotation ought to be diminished.

By duration of the visible spark is to be understood the time elapsing between the first instant at which the spark commences, and the instant when, owing to a diminution in luminous intensity, it ceases to illuminate sufficiently the lines of the apparatus, so as to give a sensible image to the observer. The entire duration may be much greater.

The Committee further remark, that the duration of the spark being determined by the number of coincidences seen by the observer, if the degree of illumination of the lines were much diminished, it is to be feared that the number of coincidences would not diminish equally, in consequence of the enfeeblement of the light corresponding to the end of the discharge. And they think it would be of use to ascertain the effect of variations in luminous intensity, as in discharge between electrodes of various metals, placed at different distances, in gases at different pressures.

The proposers of the method have not been able to make appreciable the duration of a spark from an ordinary machine; but they found the duration of the discharges of condensers varies with the surface of these, with their arrangement and the resistance of the circuit. It varies also with the striking distance, the nature of the balls, and the humidity of of the air. In general, the duration increases with the condensing surface, and with the distance between the balls, and diminishes with the length of the circuit.

The limits of duration, given by their observations, are four-millionths of a second, and eighty-six-millionths of a second—with a possible error of one-millionth of a second.

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FORMATION OF STANDARD MEASURES IN ELECTRICAL QUANTITIES.

[Translated from the Journal des Telegraphes.]

The improvements recently made in Telegraphy have brought this branch of science to such a point of perfection that it is deemed necessary to adopt general and definite measures in the calculation of resistances, and other electrical estimates, in order to substitute a stricter language and more precise data to the quackish rules and hypotheses of former years.

Several standards of resistance are still in practice, which almost unexceptionably spring from arbitrary estimates, allowing nothing beyond a bare comparison with similar quantities.

In England, America, East India and Australia, a system of definite standards has been generally adhered to, which we propose to examine briefly by presenting a summary of the investigations, entitled "Committee on Electrical Standards," made by the Board of the British Association for the Progress of Sciences, and also of the reports published on the same subject by Messrs. Ferguson, Fleming Jenkin, and Latimer Clark.

Weber and Thomson were the first in proposing a system enabling the calculator to express electric quantities in positive standards, which they selected precisely because of the connections existing reciprocally between them and the standards of power and work, which henceforward ought to be accepted as the universal link of all physical standards.

Mr. Jenkin presented the original idea of this system in his sketch on the electric instruments exhibited at the International World Fair of 1862.

"A battery or rheomotor of a standard electro-"motive power will generate a current of standard "power in a circuit of standard resistance, and "through this circuit it will convey, in the standard "of time a standard quantity of electricity which "will perform, during the same time, a standard of "work or its equivalent. As these relations do not "determine the complete magnitude of the serie of "standards, Weber proposed several ways of ob-"taining this serie; but as standards are used which "are taken from observations on the magnet, the "most expedient will probably be found to be that "which allows to determine the serie by means of "the definition of standard of current, in which case "the standard is that of a current, the standard "length of which imparts from the standard of dis-"tance a standard of power on the standard of the "magnetic pole. As for the definition of the stand-"ard of the magnetic pole proposed by Gauss and "Weber, it depends entirely upon the standards of "volume, length and time."

Mr. Ferguson gives the following definition of the standard of current: The standard of current, says he, is that which, in a wire measuring one metre, forming an arc having a radius of one metre, or, which is the same thing, an arc of 57¼ degrees, would repel a standard pole to the centre of the circle with a standard power. The whole circumference of a circle having a radius of one meter is 6m. 2832; it would consequently repel a pole of 6.2832 standards of power. If the circle were placed in the magnetic meridian, the deviation shown by a little animated needle situated in its centre, as practiced with the galvanometer of tangents, would be determined by the whole circumference, so that the force of the current, calculated only on one metre of that circumference, enters but for $\frac{1}{6.2832}$ part in the deflective force. In a straight wire one metre long, the standard current repels a similar standard to a distance of one metre with a standard force. A standard magnetic ground repels, with a standard of force, a standard current of one metre, kept up at right angles with the line of magnetic forces; consequently, in a standard magnetic ground, one metre of standard current, forming an arc of 57¼ degrees, and kept up in the magnetic meridian, would produce a deviation of 45 degrees on a small animated needle placed in its centre.

Thus, in determining the standard of electric resistance and other quantities of the same kind, the only thing to be done is to adhere to the natural congruities existing between them and the fundamental standards of time, volume and space.

In the electro-magnetic system of Weber and Thomson the following equations are deducted from the relations between the electric and mechanical standards: $W = C^2 R t$ in which W is the work performed during the time t, by a current C, through a conductor of resistance R. Such are the laws of Joule and Thomson.

On the other hand Ohm gives the following law: $C = \frac{E}{R}$ wherein E expressed the electro-motor power; and we possess likewise an original relation offered by Faraday in the formula $Q = C t$, where Q is the sum of electricity conveyed and neutralized in the time t by current C.

Finally, the whole system is made definite by the application of the law of Gauss, the terms of which require that the standard of length of the standard of current will produce the standard of power on the standard of pole from the standard of distance.

If, dismissing the idea of magnetism, this last definition may be expressed as follows: The standard of current—passing circularly through two circles of an area standard, disposed in vertical plans and at right angles respectively, provided one of the two circuits be at a great distance D above the other—will determine between the circuits or couple the magnitude of which will equal the converse of the cube of the distance D. This last relation expresses the proposition made by Weber for the concatenation of electric and magnetic standards.

With the help of these relations the four magnitudes, R C Q and E are determined without resorting to any other standards but those of time, volume and space, and when reduced to these fundamental standards it is made manifest that the quantity expressed by R represents only a velocity, that is, the quotient of the length by the time.

This is the reason why the definite standard of resistance is represented by $\frac{\text{metre}}{\text{seconde}}$ in the same manner as the common and indefinite standard of work is expressed under the designation of kilogrammetre or metregramme.

It is difficult to give a common-place definition of what a standard is, but the following explanation presented by Mr. Jenkin will show how an actual velocity can be resorted to in measuring a resistance by using the velocity with which in some instances it is necessary to put in motion a part of a circuit in order to induce a given current into the circuit, the resistance of which is to be calculated.

"The resistance of the definite $\frac{\text{metre}}{\text{seconde}}$ is such "that a current produced in a circle possessing "of such a resistance imparted by the electro-mag-"netic force of a straight rod of one metre in length, "moving in a magnetic ground of standard intensi-"ty, perpendicularly to the lines of force and to its "own direction, with a velocity of one metre in a "second, and accomplishing no work or equivalent "of work, would determine, in that circuit and in "one second, a total quantity of heat equivalent to a "definite unity of work, or, according to Joule's "experiments, enough caloric to increase by one de-"gree centigrade the temperature of 0.0002405 "grammes of water to its maximum of density."

Thus the relations, either between quantities called by Weber electro-magnetic standards, or those existing between those quantities and ordinary mechanical standards may be recapitulated as follows:

The standard of current conveys a standard of electricity through a standard circuit in the standard of time.

The standard of current running through a standard conductor of length will impress a standard of force on the standard pole, from the standard distance.

The standard of current in a standard conductor of length produces an effect equivalent to the standard of work during the standard of time.

The standard of current will be produced in a standard circuit of resistance by the standard of electro-magnetic force.

We will not examine here the contrivances put in practice by Weber and the British Association Committee to ascertain the exact measure of the resistance of a wire.

The standards of resistance of the British Association are composed of an unalterable alloy of platinum and silver representing a very near approximation to 10,000,000 $\frac{\text{metres}}{\text{secondes}}$ of Weber's definite electro-magnetic system. The *unit* $\frac{\text{metre}}{\text{seconde}}$ being too unimportant for practice it was agreed on that no designation implying an idea of definite quantity would be given to this standard, and it received accordingly the name of ohm or ohmad, in order that, if subsequently better methods of determination should be devised, this standard might be used, by adding thereto a simple co-efficient, in reducing to definite measures those taken in ohms.

The standards of resistance of the dielectric are known as megohms of one million of ohms each, one microhm being the $\frac{1}{1000000}$ part of an ohm.

The standard of tension or electro-motor power is called volt, and according to a late determination of Professor Sir William Thomson is equal to 1,004 of tension of one of Daniell's elements. One million of volts form a megavolt, and the microvolt is $\frac{1}{1000000}$ of the volt, which is equal to 100,000 definite electro-magnetic standards of tension.

The standard of quantity is the farad, divided into microfarads. One megafarad contains one million of farads.

The farad is that quantity of electricity which would, with an electro-motor power of one volt, overcome in one second the resistance of one megohm, and as these quantities vary in inverse ratio of the resistance, a megafarad would overcome the resistance of one ohm in one second.

The farad is the 100,000,000th part of a definite electro-magnetic standard of quantity, and the megafarad $\frac{1}{100}$ of same.

The standard of current of the British Association is a current of one farad per second (that has sometimes been called galvat), or that which would run: with the tension of one volt, through the resistance of one megohm, or with the tension of one microvolt through the standard of resistance. It is equivalent to the $\frac{1}{10000000}$ of the natural electro-magnetic standard of current, or to the standard of tension through the standard of resistance.

The standard of power in metrical measures is that which has produced a velocity of one metre in one second in a volume weighing one gramme, after an action of one second on that volume. As gravity alone imparts a velocity of 9m. 808 per second to one gramme weight, it follows that the natural

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standard of work is the effort which is necessary to put in motion $\frac{1}{9808}$ of one gramme to a distance of one metre in one second.

The conventional standard of work, W, generally used in metrical measures is, however, the effort wanted to run up a weight of one gramme to a height of one metre, and is called metre-gramme. Consequently, it is equal to 9,808 definite standards of work. The electrical work is equivalent to the quantity of work performed in one second multiplied by the depression of tension, or difference of potential, varying thus as the number of farads multiplied by that of volts. The exact standard of work is equal to 1,000 volts-farads, and the metre-gramme or conventional standard to 9.808 volt-farads per second, or 9,808 farads descending in one second from one volt of tension.

From the above it is made manifest that the system of electrical measures adopted in England is definite, and rests on natural and invariable bases instead of being deducted from arbitrary quantities having no connection between them. This coherent and rational system contributed powerfully to the present advance of the electric science, and there is no doubt that before long it will be put in practice everywhere.

CORRESPONDENCE.

To the Editor of the Journal of the Telegraph:

Will you allow me space to enquire whether outsiders can be admitted to your Insurance Organization? Why not? You have the machinery in operation, and evidence enough that the plan is a good one. Will you let book-keepers, for instance, into membership? If so, your membership might reach thousands, which would be mutually beneficial to your own employés, and others uniting with them.

I. C.

Answer:—"Outsiders" are not eligible to membership. The Association was formed for the benefit of telegraphers only. The amount of labor required to carry on the affairs of the Association as it is, is quite large, and would be increased to a serious burden by the plan suggested.

W. J. Mathews is informed that he can be supplied with bound volumes, Nos. 3 and 4 of the Journal, and with the back numbers of the current volume, also with sets nearly complete of vols. 1 and 2. Price, for bound volumes, two dollars per copy.

W. K. Applebaugh, 145 Broadway, New York, is the Secretary of the Telegraphers Life Insurance Association. Apply through him.

There are ten words in the following:

"Draft matures Saturday. Bergfeld won't recall unless protested for non-payment."

There are ten words in the following message. In all such cases the figures are to be counted exactly as expressed in the words.

"Want to go south eight-thirty, (8:30) this evening."

FOREIGN TELEGRAPHIC ITEMS

THE WEST INDIES AND PANAMA CABLE EXPEDITION.

From Kingston, Jamaica, under date of August 10, by the steamship Rising Star, we have the following news report:

"Sir Charles Bright, the electrician, arrived here in the British mail packet from Southampton, to look after the wire covered cable between this city and Aspinwall. The cable fleet arrived in Kingston reporting the loss of the greater part of their grappling gear, and without any favorable tidings of the lost cable. After coaling and undergoing some repairs the vessel will return to the search, this time under the direction of Sir Charles Bright himself. Mr. Edward Bright returns to England on important business.

"It is reported that the Great Western Telegraph Company, to complete their West India and South American arrangements, have decided upon running a line of cable from St. Thomas direct to Aspinwall, St. Thomas being connected with another line of cable to the Island of Bermuda, which connects with New York on the one hand and England on the other. Messages are to be sent at the rate of twenty words for twenty shillings."

By royal decree the Platino-Brazileira Telegraphic Company has obtained authorization to operate in the empire, and approval of the statutes. The company is formed to carry out the Lamas telegraph concessions from the Argentine and Oriental Governments, with power to contract with the Brazilian Government for connecting the Argentine and Oriental lines with those of Brazil, and to purchase the Lamas concession for telegraph cable between Rio Janeiro and Montevideo.

The London *Railway News* under date of August 9, says:

"The tendency of prices in Telegraph Shares has been towards lower values, and the dealings have not been numerous. Anglo-American have fallen 1 to 2 per cent.; British Australian, ¼; British Indian Extension, ⅜; China Submarine, ⅛; Mediterranean Extension, ¼; Société Transatlantique Français, ¼ to ½; Submarine, 5; West India and Panama, ¼. The fall in the price of these securities is unaccountable. The business of the submarine telegraphs continues very large, and the companies are not subject to any of the advances in the price of materials which affects railway property.

The practice hitherto in vogue by the German State Telegraphs of counting the two words, "*via* Amsterdam," as an integral part of a message sent to France or any other country over the Dutch lines, or "*via* Southampton," if sent to Gibraltar, Spain, Portugal and America, through England, has created much discontent and grumbling, as it really has nothing to do with the actual contents of a telegram, which, with its limited number of words, and even the most acutely considered mode of packing, is found to cost quite money enough without the deduction of two words intended simply to indicate to the officials the route selected, and which are always suppressed in the telegram as delivered to the recipient. It has, therefore, caused great satisfaction to find that on the urgent representation of the Hamburg Chamber of Commerce, the Director-General of the Telegraphs has gracefully given way to the public wish, and issued orders to the subordinate officials of his department no longer to count the two words in question, which in the future are only to be written in parentheses on the margin, and not charged.

From Queensland we learn that telegraphic communication continues to extend notwithstanding political fixation. Tenders have been voted for an extension from the Burdekin River to Ravenswood. The line from Cardwell to the Gulf of Carpentaria (393 miles) was opened on the 3d of January last; it is, therefore, ready for union with the cable from Java. There is a proposition now before Government, with respect to that same cable communication, which will be likely to obtain more favor than the South Australian scheme. With the exception of the communication between Java and Port Darwin, arrangements are perfected for complete telegraphic intercourse with Europe. The line by Queensland is considered, for practical purposes, far safer and more easily maintained than the South Australian line, which is on the point of being completed.

Telegraphic despatches are now received in South Australia nine days from London.

The total number of messages forwarded from English postal telegraph stations during the week ending August 3, 1872, was 330,590—an increase over the corresponding week of the previous year of 77,455.

The total number of messages forwarded from Postal Telegraph Stations in the United Kingdom during the week ending August 10th, 1872, was 320,555, and during the corresponding week of 1871, 251,898; showing an increase in the week of 1872 on that of 1871, of 68,657 messages.

The receipts of the Great Northern Telegraph, on their European lines, during July were 124,293fr. (£4,922), against 105,385fr. (£4,216) in July, 1871—showing an increase of 18,808fr. (£756).

It is reported that a line of telegraph cable has been arranged for to be laid between the island of Jamaica and Belize, the capital of British Honduras.

HYDRO-ELECTRIC CABLE.

Experiments are continuing with this new invention of M. Tomasi, 69 Avenue de l'Alma, Paris, which depends upon undulations in a fluid vein confined in a copper tube, and which, it is said, is about to be practically applied. The latest result reported is that the inventor has succeeded in dividing the pressure exercised at the outset into and distinguishing the two parts—one belonging to the receiving apparatus, which is constant, and the other appertaining to the cable or transmitting fluid. The latter is weak, not exceeding the third of an atmosphere per kilometre, and is variable in direct proportion, apparently, to the length of the cable. Hence the pressure to be exerted does not exceed practicable limits.

The Academy of Sciences in Bologna has announced that a prize of 1,200 *lire* ($240), the "Aldini Prize," will be awarded to the author of the best scientific experimental essay on galvanism or dynamic electricity. Essays intended for the competition must be sent in between July 1, 1872, and June 30, 1874, and must be written in Italian, Latin, or French. They must be either written or printed; but, in the latter case, must not have been published previously to the two years above mentioned. Each essay is to bear a motto, and to be accompanied with an envelope stating the name of the author. They must be addressed to the Perpetual Secretary of the Academy of Sciences of the Bologna Institution.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory and Province on the Continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, SEPTEMBER 2, 1872.

UNIFORM RATE FOR THE TRANSMISSION OF TELEGRAMS.

A great deal has been said in regard to the beneficial results which are claimed to have attended the working of the Montreal Telegraph Company's lines during the past year, on a uniform 25-cent rate, throughout the territory covered by them, in place of a moderately high tariff regulated according to distance. The inference naturally drawn from the statements made, was, that the change in the tariff had effected a material average reduction in the charges, and that this reduction had been more than compensated for by the increase in the traffic. Now let us examine the facts and see if there is really anything exceptional in the experience of that company which can be usefully adopted by ours, or which shall tend to show any different result, in telegraphic economy, than that hitherto developed.

The following official statement of the operation of the Montreal Telegraph Company for the years 1870 and 1871, will serve to show the results of the new and old tariffs:

Number of messages sent in 1871	1,259,653
Do. do. 1870	1,006,102
Increase in 1871 (about 25 per cent)	253,551
Gross receipts in 1871	$392,687 20
Do 1870	362,865 39
Increase in 1871 (about 8 per cent)	$ 29,821 81
Expenses in 1871	$242,890 83
Do. 1870	208,907 84
Increase in 1871 (about 15 per cent)	$ 33,482 99
Net profit in 1870	$153,957 56
Do. 1871	150,296 37
Decrease in 1871 (about 2½ per cent)	$ 3,661 18
Average tariff in 1870	36 cents.
Do. 1871	31 1-10 do.
Average reduction (about 13 per cent)	4 9-10 do.
Number of miles of wire in operation in 1871	14,337
Do. do. do. 1870	11,783
Increase in 1871 (about 21 per cent)	2,554
Number of offices in operation in 1871	805
Do. do. 1870	675
Increase in 1871 (about 19 per cent)	130

There was an increase in 1871 over 1870 in every item of expense, but largest in that of salaries which—

For 1871 was	$158,529 39
And in 1870	131,943 43
Increase in 1871 (about 20 per cent)	$ 26,585 96

Thus we find that the change in the tariffs only resulted in a reduction of $4\frac{3}{16}$ cents on each message, and that the effect of this reduction was to decrease the net profits as compared with the year previous, about 2½ per cent.

On the first of October, 1869, the Western Union Company made an average reduction in rates of about 15 per cent. This was followed in the succeeding month by a decrease in the gross receipts as compared with the same month of the preceding year of $41,385 07, accompanied by an increase in the current expenses of $26,929 26, making a difference in the net profits of $68,314 33. On the first of January, 1870, the new half rate tariff for messages sent at night went into operation; the result of which was a decrease in the gross receipts of $62,113 21, and an increase in the expenses of $58,452 38, making a decrease in the net profits as compared with the corresponding month of the previous year of $120,565 59. Then October 1, 1869, when the reduced tariff went in operation, to May 1, 1870, a period of seven months, the gross receipts were $233,273 less and the expenditures $186,019 more than for the same months of the preceding year, making a difference in the net earnings of $419,293.

It has taken this Company two years of time, and has required the erection of over 20,000 additional miles of wire, to so increase its traffic under the reduced tariff as to yield as large a net revenue as it enjoyed previous to the reduction in 1869.

These facts demonstrate very conclusively that an increase in the amount of traffic in the telegraph business requires a corresponding increase in the wires and operators, and that the per centage of expense increases very approximately to the increase in the number of messages transmitted.

INFORMATION FOR MANAGERS.

New Tariff Books are now being sent out. All offices will soon be supplied. The offices are arranged alphabetically, by States. This will greatly facilitate the finding of offices where there are many of the same name. As soon as these books come into use, it is desired that the postings from the Tariff Circular in the JOURNAL shall be made at once, at every issue. This is important. Were this done promptly and correctly, no errors in rates would occur. Hereafter, ignorance in these matters will be deemed inexcusable.

Red messages must be held until full rate and press business is out of the way. The object is two-fold; to give important business better facilities, and to occupy the wires *at night*. Red messages on the hooks in the morning should be got off early. Offices which do not answer calls promptly in the morning, should be reported to the superintendent at once.

WESTERN UNION TELEGRAPH COMPANY,
TREASURER'S OFFICE,
NEW YORK, August 20, 1871.

To all Managers of W. U. Offices:

Drafts remitted to this office should be made payable to the order of R. H. ROCHESTER, TREASURER.

Great inconvenience is caused by the omission of the word "Treasurer."

R. H. ROCHESTER, Treasurer.

INFORMATION WANTED.

Can any of our readers inform us why the consumption of the number 1 (ordinary receiving) blank exceeds that of the number 2 (ordinary counter) blank by fully ten per cent? Also, why the consumption of number 44 (red receiving) is fourteen per cent. in excess of number 45 (red counter) blanks. Statistics show this to be the case.

The discrepancy between the consumption of the ordinary blanks can partially be accounted for in the fact that large numbers of telegrams upon railroad service, as well as messages relating to our own service, are not written upon the printed form, while answers which may be received are generally written upon the number 1 blanks. Yet this cannot account for all of the difference, especially when the enormous waste of the counter blank is taken into consideration.

The large discrepancy between the red blanks is the more remarkable inasmuch as nothing is received upon the receiving blanks but its legitimate business. Considering the waste of the counter blank, the consumption of the receiving blank should be less than that of the former, instead of, as it is, fourteen per cent. in excess.

WE have received from the artist, Mr. A. B. Greene of St. Louis, a photographic copy of his picture entitled "Neglect of Duty," together with a circular of description, testimonials, &c. The picture is so suggestive in itself that no description seems necessary to accompany it.

The subject is one that has never before been illustrated, and this design, portraying as it does a *moral* that concerns *all telegraph operators*, particularly those connected with the running of trains, has been received with such enthusiasm and encouraging encomiums by all railroad men and others who have seen it, that the artist (an operator for many years) has been induced to have it duplicated by photographing and circulated.

The picture represents, in the foreground, a train dispatcher or operator having fallen asleep in his chair; in the upper background, as a possible consequence, the collision and destruction of two trains, while Death stalks in from the right to complete the scene.

This little work is really excellent, and its influence for good will readily be felt by those who are so fortunate as to see it. We hope and believe that these copies will meet with a large and rapid sale.

A PLEASANT little affair was that which occurred a couple of weeks since, when Mr. T. C. Harvey, Train Dispatcher of the Clarksville Division of the Louisville and Nashville and Memphis and Louisville Railroad, was presented by the operators under his supervision with a set of nickel plated telegraph instruments. While, on principle, we are not in favor of presentations from subordinates to superiors, yet we can see how gratifying such an occurrence must be to one who really has the welfare and interests at heart of those under him. Mr. Harvey is to be congratulated in possessing these qualities, and also in being associated with men who can appreciate them.

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A CALLED meeting of the telegraph operators along the line of the Kentucky Central Railroad was held on the evening of August 15th, 1872, for the purpose of expressing their sympathies in regard to the death of their fellow-operator, James E. Woodruff.

The meeting was called to order by J. S. Lyle at 7½ P. M.

C. W. Caton was elected chairman and A. Bishop secretary.

A motion was made that the chair appoint a committee to draft resolutions. The committee consisted of J. S. Lyle, J. E. Pogue and J. T. Sharrard, who reported as follows:

WHEREAS, It has pleased Almighty God to remove from our midst our late young friend and fellow-operator, James E. Woodruff,

Resolved, That in his death we mourn the loss of a highly esteemed friend, an able and trustworthy fellow-worker and a kind and genial companion, whose good character and deportment has ever commanded our respect and esteem.

Resolved, That we tender to the bereaved family of the deceased our heartfelt sympathy in this their hour of affliction.

Resolved, That a copy of these resolutions be sent to the JOURNAL OF THE TELEGRAPH for publication.

J. E. POGUE,
J. T. SHARRARD,
J. S. LYLE.

Motion was then made and carried that the chair appoint a committee of two to present a copy of these resolutions to the family of the deceased, and that they also be printed in the Cynthiana and Lexington papers.

The meeting then adjourned.

C. W. CATON, Chairman.

A. BISHOP, Secretary.

WE have received a number of replies in answer to our request in the JOURNAL of August 1, for information as to the whereabouts of Mr. Charles H. Hubbard. He is reported as being in St. Louis, in Charleston, S. C., in Towanda, Pa., and in Memphis, Tenn., all at or about the same time. Is Mr. Hubbard ubiquitous?

We are obliged to our friends for answering so promptly.

THE lower classes in Japan are afraid of the telegraph. They cannot altogether see "how the old thing works," and they are simple enough to think that it is the device of the devil, and that the wires are coated with the blood of young women, and that the census now being taken is for the sole purpose of finding out the number of available Japanese maidens whose blood will do for telegraphic purposes. The idea is a curious one, and it is strange that the Japanese should not understand the explanation.

ELECTRICAL WONDERS.

By the mirror galvanometer of Sir William Thomson, which was of the utmost importance in securing the success of the Atlantic Cable, a ray of light is reflected from a minute mirror that is attached to a magnetic needle. When the electric current passes the magnet is deflected, and the movement of the reflected spot of light over a scale indicates the resistance to the passage of the current. The united weight of mirror and magnet is three-quarters of a grain.

During the experiments with the Atlantic Telegraph both cables were connected at the American end, giving a circuit of more than four thousand miles, yet a current passed through the whole distance in less time than a person could pass across the small room in which the experiment was made—and, most wonderful of all, the battery that accomplished this result was contained in a lady's silver thimble.—*Scribner's for September.*

WE find the following letter from President Orton, in the New York *Tribune* of August 13. Mr. Orton tells the gratifying story so completely that no comment is needed:

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, August 12, 1872.

To the Editor of the Tribune:

SIR:—I find the following in the Money Article of the *Tribune* this morning:

"The most decided fall was in Western Union "Telegraph, which was selected as the special object "of attack, and was pushed down to 70⅛—a fall of "4½ per cent. The depression in this stock is at- "tributed to the rumored failure of the Company to "negotiate their real estate bonds in the London "market, and the alleged necessity of the sale of "the Company's stock to provide the means for the "construction of the new building, to be erected on "Broadway in this city."

Concerning this rumor, permit me to state:

First: The bonds of this Company for $1,500,000, issued for the purpose of providing funds wherewith to pay for the land and the erection of a building thereon, at the corner of Broadway and Dey streets, in this city, were sold and delivered to, and paid for by a London house in June last, at par, in currency.

Secondly: As payment has already been made for the land, and the remainder of the proceeds of the bonds is ample for the erection of the building upon the plans adopted, "the alleged necessity of the sale "of the Company's stock to provide the means for "the construction of the new building," does not exist. Not one share of the stock purchased for account of the Company has been, or will be sold.

The Managers of this Company have never had so many and so substantial reasons for being satisfied with the condition of its affairs, and with the prospects for the future, as at the present time. Its revenues, gross and net, are larger than ever before, and the evidences are abundant that the increase of both in the immediate future will be greater than during any corresponding period in the past.

Very Respectfully,

(Signed.) WILLIAM ORTON, President.

IMPORTANT TELEGRAPH EXTENSION.—The Western Union Telegraph Company has just completed the extension of its lines to the Straits of Mackinaw. This means of speedy communication will prove a matter of great importance to the marine interests of the lakes, and supplies a want that has heretofore been sorely felt by vessel owners and insurance companies. Offices have been established at Cheboygan, Duncan City and Crawford's Quarry, and one will be opened in a few days on the dock at Old Mackinaw. Messages for Mackinaw Island may be sent over daily by boat from Cheboygan or Old Mackinaw.

ELECTRIC LIGHT.—The Alliance Company, at Paris, are now manufacturing improved magneto-electric machines for the electric light. These are now made with four disks, and supply from 230 to 300 careel jet burners, with a speed of 350 revolutions per minute, and driven by a 2½ horse power steam engine. The machines certainly seem expensive, costing £320 each; but it is estimated that thereby the combustion of a few pounds of charcoal gives an illuminating effect equal to that of 25 pounds of colza oil. This mode of illumination, therefore, is ultimately inexpensive, especially when applied on the large scale, for ships, large halls, light-houses, &c., for which it is well adapted; and we shall, no doubt, soon hear of new applications of the invention.

TARIFF BUREAU.

SENI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York.
September 1, 1872.

To all Offices on W. U. Lines:

The following changes in tariff have occurred since August 15, the date of the last tariff order.

Managers are hereby required to enter these changes in their tariff books as soon after the receipt of the JOURNAL *as possible:*

NEW OFFICES.

59 Angora, Pa.
289 Boswell, Ind.
Bridgeport, Cal., tariff same as Napa City, Cal.
304 Bellevue, Ala.
* Cumminsville, O.
Crawfords Quarry, Mich., tariff 10 cents more than Alpena, Mich.
Cheboygan, Mich., tariff 20 cents more than Alpena, Mich.
* Chestertown, Md.
* Cromwell, Conn.
456 Doniphan, Kansas.
25 East Brookfield, Mass., re-opened.
140 Fairview, Butler Co., Pa.
175 Graniteville, S. C.
67 Hopewell Cross Roads, Md.
242 Hughes Sta., O.
465 Iowa Point, Ks.
142 Jordan Bridge, Alum Springs, Va,
* Kennedyville, Md.
10 Kingsman, Me., c'k Bangor, Me.
304 Macon Sta., Ala.
* Massey's Cross Roads, Md.
150 Mooreheads, Pa.
270 Marcellus, Mich.
357 North Henderson, Ill.
231 North Adams, Mich.
181 Point Pleasant, O.
233 Sharon, O.
465 White Cloud, Ks.
10 Winn, Me., c'k Bangor, Me.

NEW OFFICES ON OTHER LINES.

	Tariff for Other Lines.		*Leaves this Line.*
Chestertown, Md.	40	3	Townsend, Del.
Cromwell, Conn.	30	3	Hartford, Conn.
Cumminsville, O.	25	2	Cincinnati, O.
	60	4	Chillicothe, O.
	75	5	Marietta, O.
Kennedyville, Md.	30	2	Townsend, Del.
Massey's Cross Roads, Md.	25	2	Townsend, Del.

OFFICES CLOSED.

Belpre, O.; Cunningham, Mo.; Darlington, Md.; Lavacca, Tex.; Otterbien. Ind., and Port Lavacca, Tex.

GENERAL INFORMATION.

On and after September 1st, 1872, no "half rate" messages will be taken for, or received from, offices on the International Ocean Telegraph line in Florida. The offices of this Company are those whose business "leaves this line" at Lake City, Fla.

Hereafter business for Lincoln, Mattawamkeag, Oldtown, Vanceboro and Danforth, Me., will be checked direct.

WILLIAM ORTON,
President.

TELEGRAPH PROJECT IN WASHINGTON TERRITORY.—J. W. Sweeney recently started the project of constructing a telegraph line from Seattle to Port Townsend, *via* Freeport, Pt. Blakely, Pt. Madison, Pt. Gamble and Pt. Ludlow, and articles have been filed—capital $25,000. The canvass for subscriptions has proved highly successful, 104 shares being taken at Pt. Townsend alone; and at the other points such encouragements have been given as assure completion of the line, which is expected within three months.—*Chicago Railway Review.*

BORN.

WHIPPLE.—At Hightstown, N. J., August 14, 1872, to Thomas D. Whipple, lineman W. U. Tel. Co., a daughter.

MARRIED.

DE LONG—THOMAS.—At Shreve, O., August 17, 1872, by Rev. J. C. Gillem, W. H. De Long, operator P., F. W. and C. Railway, to Miss Josie E. Thomas, Manager W. U. Tel. Office, Shreve, O.

HILTON—LOUNT.—At Bay City, Mich., August 11, 1872, A. M Hilton, Manager W. U. Tel. Office, Kawkawlin, Mich., to Miss Sade A. Lount. of Kawkawlin.

WATKINS—CARNEY.—August 15, 1872, at the residence of the bride's father, by Rev. J. W. Emery, M. F. Watkins, Manager W. U. Tel. Office, Burns, N. Y., to Miss Hily A. Carney, of Burns.

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THE SERVICE.

WESTERN UNION TELEGRAPH CO.,

June, 1873.

Appointments.

Operators.	*Office.*
Theo. Ayte	Quarantine, S. I.
R. F. Brien	Claflin's, New York City.
A. P. Cottingham	145 Broadway, New York City.
B. Deklyn	Long Branch, N. J.
B. C. Edwards	Hoffman House, New York City
G. V. B. Frost	145 Broadway, "
Alice M. Goodell	" "
Eliza A. Hunter	Duane street, "
R. Livingston	145 Broadway, "
Sarah A. McCormick	" "
Laura B. Moore	" "
P. Mullarkey	" "
Louise Nash	" "
Mary R. Numan	" "
David O'Keeffe	21 Wall street, "
W. C. Pearse	145 Broadway, "
Louise P. Pine	" "
Helen A. Price	Worth st. & B'way, "
J. B. Reeves	Greenpoint, L. I.
S. D. Riddle	Canal street, New York City.
Louise Rose	145 Broadway, "
Emily L. Rose	" "
Cassie Shaw	349 Broadway, "
Mary C. Salisbury	145 Broadway, "
Helen E. Smith	" "
Mary L. Storrs	Oyster Bay, L. I.
F. J. Tubbs	Castle Garden, New York City.
Jennie L. Walton	Brooklyn, E. D.
C. L. Martin	Sussex, N. B.
William S. Dyer	Newburyport, Mass.
Oscar D. Stickney	Portland, Me.
William B. Wilde	"
W. A. Lewis	"
Charles M. Berry	"
W. F. Harris	Ashland, N. H.
D. W. Cordrey	Concord, N. H.
Geo. A. Mudgett	Lowell, Mass.
J. F. Shorey	Lyndonville, Vt.
D. J. Eastman	Manchester, N. H.
F. B. Livingston	Rutland, Vt.
F. H. Chester	Plymouth, N. H.
A. C. Harvey	St. Johnsbury, Vt.
M. J. Catlin	Crawford House, N. H.
William Batchelder	Glen House, N. H.
Sarah H. W. Stillings	Jackson, N. H.
C. Brookings	No. Conway, N. H.
D. Paul	E. Berkshire, Vt.
H. Clark	Emburgh Falls, Vt.
Jenny L. Granville	Highgate Springs, Vt.
J. F. Calkins	Richford Springs, Vt.
A. C. Wheeler	Sheldon, Vt.
H. Hazen	W. Halfield, Vt.
Geo. W. Dennett	Boston, Mass.
Geo. F. Stewart	"
James Walton	"
Miss A. J. Atkinson	"
Miss E. M. Holbrook	"
M. A. Gay	Charlestown, Mass.
Sarah Huntley	East Lynn, Ct.
William H. Moore	E. Douglass, Mass.
J. B. Gaynor	Hartford, Ct.
Miss J. H. Duganne	Middletown, Ct.
E. M. French	Neponset, Mass.
Edward J. David	Newport, R. I.
O. J. Neff	"
Charles E. Lincoln	"
F. G. Robinson	Pittsfield, Mass.
William F. McGrath	St. James Hotel, Boston.
Charles E. Shelley	Albany, N. Y.
F. H. Estabrook	Hoosick Falls, N. Y.
Mattie L. Smith	Hudson, N. Y.
E. Merrick	Depot, Hudson, N. Y.
C. Richards	Lake Mahopac, N. Y.
C. E. Arnold	Lake George, N. Y.
M. C. Joseph	Peekskill, N. Y.
Thomas S. Safford	Saratoga, N. Y.
J. V. W. Hermance	Cozzens, West Point, N. Y.
G. Van Tassel	Croton Falls, N. Y.
Geo. F. Murray	Clarendon Springs, Vt.
P. H. Lewis	Cornwall, N. Y.
A. D. Wilbur	Catskill, N. Y.
W. J. Smith	Tivoli, N. Y.
S. H. Holcomb	Maple Hill, N. Y.
Augustus H. Latz	Cataract House, N. Falls, N. Y.
J. G. Watson	Oswego, N. Y.
M. E. Hickey	Schenectady, N. Y.
Vincent Marting	Rochester, N. Y.
Kate A. Henry	Suspension Bridge, N. Y.
O. F. Webster	Syracuse, N. Y.
William A. Austin	Utica, N. Y.
E. H. Lamport	Shortsville, N. Y.
J. Robert Moore	Trenton Falls, N. Y.
A. C. Man	Burlington, Ia.
E. J. Rudd	McGregor, Ia.
John P. Davis	Racine, Wis.
T. W. Hartee	Chicago, Ill.
T. Drandolph	"
H. W. Goewey	"
C. O. Andrews	"
J. R. Le Valley	"
E. D. Moore	"
L. M. Smith	"
G. S. Carroll	"
W. D. Linton	"
R. R. Manners	"
J. P. Towler	"
S. W. Hill	Hannibal, Mo.
S. A. Judkins	Topeka, Ks.
James P. McClure	St. Louis, Mo.
James S. Nelson	"
Charles L. Snyder	"
E. Marsh	Black Hawk, Col.
J. M. Ellison	Colorado Springs, Col.
A. K. V. Hall	Denver, Col.
Geo. C. Chandler	Fort Shaw, Mont. Ter.
Lee Mantle	Junction, Mont. Ter.
J. N. Moses	Laramie City, Wy. Ter.
F. J. Phippen	Omaha, Neb.
Charles Orten	Pueblo, Col.
E. L. Pearson	Salt Lake City, Utah.
H. W. Rathbun	Oil City, Pa.
Ada Barclay	Titusville, Pa.
G. W. Bausman	Pittsburg, Pa.
A. B. Wells	"
J. L. McBretney	"
A. R. Schell	Lexington, Mich.
Allie M. Westerman	Little Mountain, O.
O. P. Wood	Meadville, Pa.
A. N. Rousch, Jr.	Portsmouth, Mich.
A. S. Van Gilder	Warren, O.
C. A. Stuart	Buffalo, N. Y.
G. H. Bowker	"
A. G. Chapin	"
G. A. Talbot	Black Rock, N. Y.
G. W. Patterson	Cleveland, O.
C. S. Johnson	Indianapolis, Ind.
J. H. Martin	Madison, Ind.
A. C. Barker	Terre Haute, Ind.
Frank P Ross	Columbus, O.
F. Converse	Florence, O.
Frank Enoch	Springfield, O.

Resignations, &c.

Mary E. Bell	Brooklyn, E. D., L. I.
R. G. W. Dennison	145 Broadway, New York City.
J. H. Emerick	" "
Emily H. Harris	" "
Sarah Johnson	349 Broadway, "
Helen V. Pratt	145 Broadway, "
M. J. Reed	Jamaica, L. I.
E. D. Stevens	145 Broadway, New York City.
E. F. Welch	" "
W. B. Wood	" "
H. W. Chambre	Quarantine, S. I.
Frank Keene	Brooklyn, L. I.
R. D. Williams	145 Broadway, New York City.
Jacob Jodrey	Sackville, N. B.
Mary L. Smith	Newburyport, Mass.
J. W. Wortman	Sussex, N. B.
William P. Merrill	Portland, Me.
J. H. Farnham	"
S. A. Batterson	"
J. D. Woodman	Ashland, N. H.
E. E. Eastman	Concord, N. H.
F. H. Stevens	Manchester, N. H.
E. G. Mason	Rutland, Vt.
W. R. Brackett	Plymouth, N. H.
A. W. Sperry	Boston, Mass.
Frank Perley	"
Frank Iago	Hartford, Conn.
L. W. Lord	"
Mary J. Long	Middletown, Conn.
Mary L. Gilmore	Neponset, Mass.
William E. Kettles	Duxbury, Mass.
Charles E. Clark	Albany, N. Y.
N. M. Freeman	Hoosick Falls, N. Y.
J. W. Keeler	Croton Falls, N. Y.
J. R. Sylvester	Catskill, N. Y.
James Ashdown	Tivoli, N. Y.
E. Comstock	Maple Hill, N. Y.
C. A. Parsons	Oswego, N. Y.
Frank Gould	Schenectady, N. Y.
John F. Agne	Rochester, N. Y.
R. S. Emerson	"
William E. Fenno	Suspension Bridge, N. Y.
Theo. H. Allen	Utica, N. Y.
J. W. Urwin	Burlington, Ia.
Geo. H. Crowns	McGregor, Ia.
F. M. Jones	Chicago, Ill.
D. M. D. Hall	"
A. L. Baker	"
A. F. Plank	"
William Wallace, Jr	"
William Connor	"
L. Colvin	"
M. J. Cornwall	Topeka, Ks.
Marcellus C. Hart	St. Louis, Mo.
Thomas P. Dudley	"
Charles W. Hammond	"
P. D. Howard	Bitter Creek, Wy. Ter.
Matt France	Colorado Springs, Col.
C. D. Hay	Denver, Col.
A. Klesick	Fort Shaw, Mont. Ter.
Geo. H. Phifer	Junction, Mont. Ter.
J. N. Benster	Laramie City, Wy. Ter.
C. D. Snyder	Pueblo, Col.
J. W. Booth	Salt Lake City, Utah.
L. A. Madison	Franklin, Pa.
W. P. Lucas	Titusville, Pa.
W. T. Hazzard	"
E. T. Ward	"
H. M. Galway	Pittsburg, Pa.
J. D. Potts	"
J. B. Bryant	"
Thomas C. Clark	"
W. H. Maize	"
E. L. Nims	Lexington, Mich.
C. E. Strong	Warren, O.
C. E. Page	Buffalo, N. Y.
G. E. Hinman	Cleveland, O.
John E. Ball	Indianapolis, Ind.
Charles N. Howlett	Terre Haute, Ind.
William F O'Garra	Columbus, O.

Transfers.

Name.	*From what Office.*	*To what Office.*
E. S. Curr	Greenport, L. I.	Jamaica, L. I.
W. Grevers	Claflin's, N. Y. City	Long Branch, N. J.
W. S. Griggs	Park Hotel, "	New York Hotel, New York City.
Eliza A. Hunter	Duane st., "	Glen Cove, L. I.
J. Mitchell	Canal st., "	Long Branch, N. J.
J. E. Morawski	Castle Garden "	Lebanon Spr'gs, N.Y.
Mary S. Rockfellow	Flushing, L. I.	145 B'dway, N.Y. City
S. W. Varney	21 Wall st. N.Y. City	Brooklyn, L. I.
E. P. Wortman	Corn Exchange "	Cotton Exchange, N. Y. City.
David Bailley	Halifax, N. S.	Windsor, N. S.
M. S. MacGregor	Windsor, N. S.	Antigonishe, N. S.
D. W. Cordrey	Lowell, Mass.	Concord, N. H.
L. G. Bagley	St. Johnsbury, Vt.	Rutland, Vt.
J. C. Robinson	Boston, Mass.	Newport, R. I.
A. S. Bedwin	Duxbury, Mass.	Boston, Mass.
William F. Snyder	"	Plaister Cove.
Edward J. Fullum	"	New York.
Miss A. F. Whitmarsh	Charlestown, Mass.	Boston.
O. J. Neff	Newport, R. I. (Main Office)	Perry House, Newport, R. I.
Ellery T. Wood	St. James Hotel, Boston	Taunton, Mass.
A. G. Rider	Taunton, Mass.	Tiverton, R. I.
S. Lawrence	Hudson, N. Y.	Catskill Mountain House, N. Y.
G. V. B. Frost	Peekskill, N. Y.	145 B'dway, N.Y. City
W. M. Mallett	Syracuse, N. Y.	Sharon Springs, N.Y.
Eugene Powers	Hannibal, Mo.	St. Louis, Mo.
O. Crary	Black Hawk, Col.	Georgetown, Col.
W. H. Nichols	Omaha, Neb.	Cheyenne, Wy. Ter.
A. McQuaide	Pittsburg, Pa.	Dixmont, Pa.
R. R. Wise	E. Foxburgh, Pa.	Foxburgh, Pa.
W. J. Hunter	Armstrong Run, Pa.	"
A. J. Stephenson	Oil City, Pa.	Titusville, Pa.
J. P. McKinstry	Cleveland, O	Erie, Pa.
D. T. Francis	Erie, Pa.	Chicago, Ill.
S. B. Derickson	Meadville, Pa.	Cleveland, O.

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JOURNAL OF THE TELEGRAPH.

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REFLECTING GALVANOMETERS.

Ampere suggested, as early as the year 1820, the employment of a galvanometer for the purpose of telegraphing, and in 1833 Gauss and Weber used a reflecting galvanometer as an indicator upon a line about one mile in length, uniting the Observatory and Physical Cabinet at Gottingen. Their alphabet was made up of combinations of right and left deflections. This apparatus, the first ever employed for practical telegraphy, has lately, in the hands of Professor Sir William Thomson, become the most sensitive of all telegraphic instruments. His reflecting galvanometer is the only instrument at present by which a cable, 2,000 miles in length, can be worked by a battery of low tension. It consists of a needle formed of a piece of watch spring three-eighths of an inch in length. The needle is suspended by a thread of cocoon silk without torsion. The needle lies in the centre of an exceedingly delicate galvanometer coil. A circular mirror of silvered glass is fixed to the needle, and reflects at right angles to it in the plane of its motion. It is so curved that when the light of a lamp is thrown through a fine slit on it, the image of the slit is reflected on a scale about three feet off, placed a little above the front of the flame. Deflections to the extent of half an inch along any part of the scale are sufficient for one signal. In so delicate an instrument, the sluggish swing of the needle in finally settling into any position would destroy its usefulness. To rectify this, a strong magnet, about eight inches long, and bent concave to the instrument, is made to slide up and down a rod placed in the line of the suspending thread above the instrument. This magnet can be easily shifted as necessity may require. The oscillations of the needle due to itself are, by the aid of the strong magnet, made so sudden and short as only to broaden the spot of light.

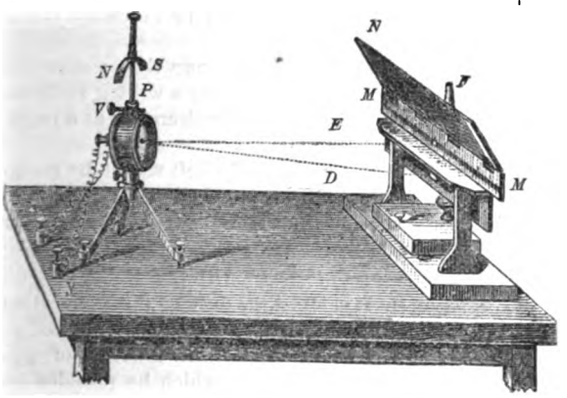


Fig. 1.

The above illustration, fig 1, shows the construction of the instrument: The galvanometer P contains the multiplication wire divided into several layers, and so arranged that it can be used for weak or strong currents, according to the requirements of the instrument. In the centre of the coil the magnetic needle is suspended, to which is attached the tiny mirror, and close before it is to be found a small collective lens, whereof the focal point lies almost in the mirror, in order to produce a sharp figure of the prism on the scale. The magnetic needle has a length of three-eighths of an inch, a breadth of one-twelfth of an inch, and a thickness of one-twelfth of an inch. The mirror connected with the needle has a thickness of only one two-hundred-and-fortieth of an inch. The magnetic needle is made from a small piece of a very fine watch spring, and the little mirror from one of the thinnest microscopic cover glasses. The magnetic needle and mirror used for signalling across the Atlantic weigh only one and one-half grains.

The entire box which encloses these parts is hermetically closed. The ends of the multiplicator wires are soldered inside the box to two screw posts, *x y*, wherewith the instrument is connected with the cable.

A curved steel magnet, N S, is fixed to a brass bar, P, in such a way that by turning the micrometer screw V, any required removal, upwards or downwards, or to the right or left, can be given to it, and by this means the magnetic needle, when in a state of rest, is kept in such a position that the picture of the slit D, which is reflected from the middle of the mirror, and likewise returns through the lens, appears upon the zero mark of the scale M M.

Opposite the galvanometer, the scale M M and the lamp F are to be seen. The light from the lamp penetrates through the slit D in an oblique direction to the looking glass, and is thrown back from it to the scale, somewhat upwards, in the direction E, where the picture of the slit is to be seen as a fine light line. The screen N can be turned up, and serves to keep the lamp-light from the scale. The instrument is necessarily used in a darkened room.

Thomson's Marine Galvanometer (fig. 2), is a reflecting galvanometer, constructed in such a manner that even the strongest rockings of a vessel wherein they are used cannot change the relative position of the small mirror towards the scale. For this purpose the magnetic bar *a* is fixed by means of three cocoon threads, at the top as well as at the bottom, to the little wooden frames A B, which carry the convolutions of wire. The cocoon threads pass accurately through the joint centre of gravity both of the magnetic bar and the mirror, so that when the multiplicator wire is turned the latter remains unaltered in its relative position to the layers of wire. The influence of the ground is thus prevented from affecting the instrument, and the magnet retains, under any changes of the instrument, the same position towards the scale which is attached to it on the same table board.

It is not less important for such a purpose to have the influence of terrestrial magnetism on the magnet destroyed. And this is attained by enclosing the multiplicator wire, with magnet *a*, looking glass and lens L, in a box made of strong soft iron, and at the same time putting up in the inside of the box a moderately strong, horse-shoe-shaped steel magnet N S, in such a manner that both its poles take hold of the rolls of wire. The magnetic action of these poles on the magnetic needle being stronger than the attractive power of the earth, the latter is neutralized by it, and the suspended needle is maintained in the position of rest under all changes in the situation of the instrument.

The small mirror is replaced by a small biconvex lens of 2½ feet focal distance, the back of it being silver plated, and forming at the same time a small concave mirror which reflects the falling rays in convergent directions, and concentrates them upon the scale. The curvatures of the lentiform looking glass are so calculated that the source of light is placed at a distance of about 1½ feet from the centre of the mirror, while the scale or the screen designed to receive the reflecting light is placed at a distance of eight feet from the focus. The screen is a flat piece of wood, covered by white paper, which is fixed on a black painted wall.

To avoid the disturbing movements of the light-shower on the screen, which are caused in consequence of the shaking and flickering of the flame, the lamp is enclosed in a cylindrical box, in which, on the side turned towards the mirror, is to be found a small slit, where the flame burns gently. When the galvanometer needle is at rest, the light-shower appears exactly on the middle of the screen in the form of a small quadrangle of ¾ of an inch in length and ¼ of an inch in breadth; when it is turned off this picture moves according to the deviation of the needle, to the right or the left, and produces in this way, as by the needle telegraph, two primitive signs, by the repeating and combining of which in groups an alphabet is constructed.

With such an arranged ship or marine galvanometer, all kinds of galvanometrical measurings can be done at sea even in very stormy weather, as readily

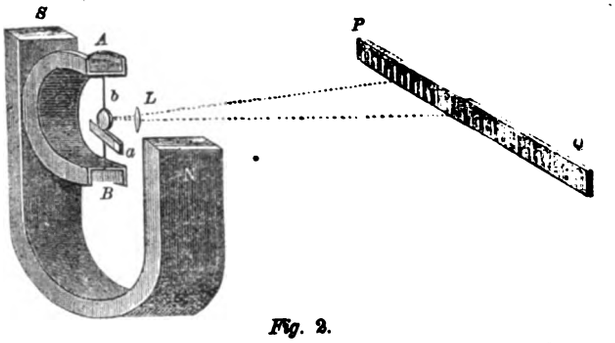


Fig. 2.

and surely as on terra firma—neither the ever changing course of the vessel nor the high running waves of the sea have any influence whatever on the movements of the light-shower.

It is easy to understand that the side—horse-shoe-shaped—magnet weakens in some degree the sensibility of the instrument; on that account, when use is made of instruments of this kind, in order to serve as cable-speaking instruments, a somewhat stronger current must be used than that required by the single reflecting galvanometer.

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CONSTITUTION OF THE TELEGRAPHERS' ASSOCIATION.

ADOPTED JANUARY 15, 1872.

Preamble.

As a vital link in the chain of commercial intercourse, a powerful accessory to the advancement of civilization, and an indispensable agent of the supreme law of the land for the protection of life and property, the labors of the telegraphic profession stand second to none in the wide field of human industry. In this conviction we, the practical operators, to whose united skill the telegraphic system of America is indebted for its present development and success, actuated by a just feeling of pride in the future welfare and standing of our fraternity, have combined our efforts for the purpose of elevating to its proper standard the occupation which we have chosen as our means of livelihood. The nature of our business is such that a vast combination of capital must necessarily ever intervene between our most intelligent efforts and the commensurate reward of an appreciative public. We most earnestly discountenance strikes, as being detrimental to the interests of both employer and employé; but as a means of attaining our aim we seek to build up, as a protection against the aggressions of this powerful accumulation of capital, an organization of labor, founded upon well-defined principles, guided by well-directed counsels, and governed by intelligent legislation, which shall become equally powerful and equally worthy of respect. In order the more effectually to harmonize and direct our movements, the following Constitution has been adopted for our government.

CONSTITUTION.

General Organization.

ARTICLE I.

SECTION 1. This organization shall be known as the TELEGRAPHERS' ASSOCIATION.

SEC. 2. The Association shall be composed of independent divisions, designated as Councils, and known by their numbers alone.

SEC. 3. All power shall be vested in the Councils through their local organizations.

SEC. 4. For the better transaction of general business, one Council shall be designated as the Supreme Council, and intrusted with the performance of all duties incumbent upon that position.

ARTICLE II.

SECTION 1. The officers of the Supreme Council shall consist of a Supreme Councillor, a Supreme Vice-Councillor, and a Supreme Secretary.

SEC. 2. It shall be the duty of the Supreme Councillor to authorize the establishment of Councils, and assign to each Council its designating number, and to authorize the distribution of all books, pamphlets and circulars that may be placed in his charge for the general use of the Association.

SEC. 3. He shall have power to appoint such assistants, not elsewhere provided for, as he may require for the transaction of the legitimate business of the Supreme Council.

SEC. 4. It shall be the duty of the Supreme Vice-Councillor to perform all duties pertaining to the Supreme Council that may be required of him by the Supreme Councillor; and, in the absence of the latter, to assume the position of Supreme Councillor.

SEC. 5. It shall be the duty of the Supreme Secretary to keep a complete record of the location and designating number of each Council, the numbers of its members and the names of its officers; to keep a true account of the expenses of the Supreme Council, and to levy such assessments upon each Council as may be necessary to defray said expenses. He shall notify the Councillor of each existing Council of the formation of new Councils, the numbers by which they are designated, the names of their officers, and the location of their headquarters. He shall retain in his possession, during his term of office, all record books and such articles as may be designed for the use of the Supreme Council, and shall allow no person to have access thereto excepting the Supreme Councillor and Supreme Vice-Councillor. He shall be intrusted with the care of books, pamphlets and circulars intended for distribution, and shall issue the same only upon requisition by the Supreme Councillor; and at the expiration of his term of office he shall deliver to his successor all property belonging to the Supreme Council, and take a receipt therefor.

ARTICLE III.

SECTION 1. Council No. 1, under whose auspices this organization is founded, shall hold the position of Supreme Council for the term of one year, dating from the adoption of this Constitution. At the expiration of that time Council No. 2 shall succeed it in the position of Supreme Council for the term of one year, to be succeeded in turn by each Council of the entire Association for the same length of time, according to the rotation of their designating numbers.

SEC. 2. After the Council designated by the highest number shall have holden the position of Supreme Council for one year, Council No. 1 shall again assume that position, to be succeeded in rotation by each Council, as before.

SEC. 3. The regular rotation of Councils may be changed at any time, in order to promote the best interests of the Association, by a majority vote of two-thirds of the whole number of Councils.

ARTICLE IV.

SECTION 1. The Councillor and Vice-Councillor of any Council holding the position of Supreme Council shall assume the duties of Supreme Councillor and Supreme Vice-Councillor, respectively, for the term of one year.

SEC. 2. The Supreme Secretary shall be elected by ballot, by the Council which is about to succeed to the position of Supreme Council, at least fourteen days previous to its assumption of the duties of that position, and the Councillor of that Council shall immediately notify the Supreme Councillor of the result of said election.

SEC. 3. Thirty days previous to the expiration of the term of office of the Supreme Council, the Supreme Secretary shall notify the Councillor of the Council upon which the duties of the Supreme Council shall next devolve, that in the event of its succeeding to that position, a Supreme Secretary should be elected by that Council.

The Formation of Councils.

ARTICLE V.

SECTION 1. The location of the headquarters of each Council shall be approved by the Supreme Councillor.

SEC. 2. Each Council shall consist of nine or more members.

SEC. 3. Any operator desirous of forming a Council shall, in conjunction with two operators of good standing, address a letter to any member of the nearest Council, to be by him presented to the Councillor; said letter to contain all necessary information regarding the number of offices which should be included in the new Council, also the names and positions of such operators as would probably become members of the Association within the jurisdiction of the new Council.

SEC. 4. If, in the judgment of the Councillor to whom application is thus made, there is sufficient evidence that the proposed Council can secure the required number of members and maintain sufficient strength to protect them from aggression, he shall appoint a suitable member of the Council over which he presides as an Initiating Officer, who shall be clothed with the necessary authority to initiate members, and shall be sent to the proposed headquarters of the new Council at such time as the applicants may appoint for their initiation.

SEC. 5. All necessary expenses of the said Initiating Officer shall be borne by the newly formed Council.

SEC. 6. When said Council shall number five or more members it may form a temporary organization, which shall continue until nine members have been initiated.

SEC. 7. Upon the acquisition of nine members the Councillor *pro tem.* shall apply to the Supreme Councillor for the designating number of the new Council; after receiving which, the Council may proceed to the election of permanent officers.

SEC. 8. In case the temporary Council shall not succeed in securing nine members, those who have already been initiated shall, at the expiration of one month, dating from the first initiation, be apportioned to the nearest established Council, until such time as the requisite number of members for the organization of the said new Council shall be obtained.

The Government of Councils.

ARTICLE VI.

SECTION 1. The officers of a Council shall consist of a Councillor, a Vice-Councillor and a Secretary.

SEC. 2. Any member of a Council in good standing shall be eligible to those offices.

ARTICLE VII.

SECTION 1. The officers shall be elected by ballot, and shall hold their respective offices until the fifteenth day of January next ensuing after their election.

SEC. 2. The election of officers shall take place on the fifteenth day of December of each year, and they shall enter upon the duties of their offices on the fifteenth day of January following.

SEC. 3. If, on the first balloting for any of the above offices, there shall not be a majority of all the votes taken in favor of one candidate, the members shall, upon the next balloting, confine their choice to the three candidates having the largest number of votes; and, after the second ballot, to the two candidates having the highest number.

SEC. 4. A majority vote shall be necessary for a choice.

SEC. 5. Any officer may at any time resign the duties of his office, by presenting a written resignation, which shall be read by the Secretary at a regular meeting of the Council.

SEC. 6. Should any office be left vacant by resignation or death, such vacancy shall be filled by the election of some member to serve for the remainder of the term.

ARTICLE VIII.

SECTION 1. It shall be the duty of the Councillor to attend and preside over all meetings of the Council, to represent at all times the interests of the members of the Council over which he presides in all cases of aggression by their employers, and, if necessary, tender for their protection the support of the Association: *Provided*, Such action be approved by a two-thirds vote of a meeting called for that purpose. He shall have power to suspend any member of the Council over which he presides, subject to the consideration and final action of the next ensuing meeting; also to call a special meeting of the Council, by giving five days' notice; to appoint

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such committees as may be necessary to facilitate the transaction of business, and at each meeting of the Council to appoint a Guard, whose duty it shall be to prevent the ingress of improper persons.

SEC. 2. It shall be the duty of the Vice-Councillor to attend all meetings of the Council, and, in the absence of the Councillor, to assume all duties incumbent on that officer. He shall conduct the balloting for new members, and administer to them the obligation.

SEC. 3. It shall be the duty of the Secretary to attend all meetings of the Council and keep a suitable record of the proceedings, and to keep a complete register of the names of members, their ages, the date of their admission to the Association, and the name of one member by whom they were proposed. He shall conduct all correspondence pertaining to the business of the Council, and shall be entrusted with the finances of the Council, and shall levy such assessments upon the members as may be necessary to defray the ordinary expenses of the Council, and collect the same, and shall also make immediate returns to the Supreme Secretary whenever requisition shall be made upon the Council for funds. He shall keep an accurate and detailed account of all receipts and expenditures, and submit an annual report of the same for the approval of the Council. He shall also submit a quarterly report of the numerical strength of the Council to the Supreme Councillor, and notify him of all changes among the officers and members.

SEC. 4. In case any member shall neglect to pay an authorized tax, after being called upon twice, it shall be the duty of the Secretary to notify the Councillor of the fact, stating, if possible, the reasons for such default.

ARTICLE IX.

SECTION 1. It shall be the duty of every member of the Association to cheerfully acquiesce in all measures that may be duly initiated by the Council to which he belongs, in accordance with the letter and spirit of the Constitution. *The firm and unswerving loyalty of every member is the fountain of power, which must be maintained at all hazards.*

SEC. 2. Any member feeling that he has just reasons to complain of the action of any Company or member, will be expected to make a written statement of his case to the Councillor of the Council to which he belongs, and may insist upon a hearing.

SEC. 3. It shall be the duty of every member of the Association to conduct himself, at all times and in all places, in a manner becoming the character of the organization; and, while protecting him from aggression, *the Association expects every member to perform his whole duty toward his employers, in accordance with the terms under which he was engaged*, provided he does not thereby conflict with a duly authorized order from the Councillor of the Council to which he belongs.

SEC. 4. In case any member resigns a position, his duty shall be to notify the Councillor, giving his reasons for such resignation.

SEC. 5. No member shall propose a candidate for membership unless he be thoroughly conversant with his qualifications and habits, and fully satisfied that he will become a worthy and upright member.

SEC. 6. *Habitual* intoxication cannot be permitted, and inability to perform his duties by reason of such indulgence shall be sufficient cause for the suspension of any member.

SEC. 7. Every member is expected to notify all trustworthy operators of the existance of the Association, and acquaint them with its objects and purposes; but he shall urge no person to join it beyond assuring him of the high character of the organization.

Conditions of Membership.

ARTICLE X.

SECTION 1. Any telegraph operator of good standing, not under eighteen years of age, and who has resided within the jurisdiction of the Council to which he applies for admission, for one month, shall be eligible to membership in the Association.

SEC. 2. A proposition for membership must be indorsed by three members in good standing, and accompanied by an initiation fee of one dollar, and may be presented at any meeting of the Council, to be balloted for at the next ensuing meeting.

SEC. 3. The casting of three black balls shall be necessary to reject a candidate; and, in case of such rejection, three months shall elapse before his name can again be presented.

SEC. 4. After being duly elected, every candidate shall be required to bind himself by the following obligation, which may be administered by any officer of the Council, in the presence of two or more members. He shall then be required to subscribe thereto, which shall be placed on file by the Secretary.

Form of Pledge.

I, A—— B——, do hereby acknowledge that, having voluntarily become a member of the Telegraphers' Association, and being made cognizant with its objects and intentions, I do hereby pledge my sacred honor that I will aid, in whatsoever manner I may be required, the advancement and protection of its members, and that I will reveal neither the names of the officers nor members, nor the purposes of the Association, excepting so far as may be necessary to encourage the admission of new members; and I will obey all such rules or orders as may be promulgated through the proper officers, and sanctioned by a vote of the Council of which I am a member.

(Signed) A—— B——.

(Witness) C—— D——.

SEC. 5. Every member of the Association shall be entitled to a card of membership, to be signed by the Councillor and Secretary of the Council to which he belongs, and endorsed upon the back with the signature of the rightful owner, and cards to be renewed every six months.

SEC. 6. A card of membership shall be of the following form:

This is to certify that A—— B—— is a member in good standing of Council No. —, Telegraphers' Association.

——. ——, Councillor.

(Date.) —— ——, Secretary.

Good for six months from date.

SEC. 7. A card of membership, together with the password, shall entitle their rightful owner to admission to the meetings of any Council, and to recognition by any member of the Association.

SEC. 8. Any member may withdraw from the Council with which he is connected with the consent of a two-thirds vote of any meeting, and shall be entitled to a certificate of withdrawal, signed by the Councillor, which shall entitle him to membership in any Council without the payment of the usual initiation fee.

ARTICLE XI.

SECTION 1. Each Council shall have power to adopt such measures as may be necessary to guarantee to all of its members just treatment in accordance with their standing as members of the Association, and ample protection from all acts of aggression which may be imposed upon them.

SEC. 2. Each Council shall have power to adopt such By-Laws for the government of its members as it may deem requisite, provided no such laws in any way conflict with the provisions of this Constitution.

SEC. 3. No movement for the protection or advancement of the interests of any member shall be inaugurated, excepting it be authorized by a two-thirds vote of a meeting of the Council, five days previous notice having been given of the nature of the business about being acted upon.

SEC. 4. In the event of any such movement being authorized, it shall be the duty of the Councillor of the Council so acting to communicate in cypher by telegraph and mail with the Supreme Councillor and the Councillors of all other Councils, detailing the nature of the movement to be inaugurated, and invoking their aid in case it should be found necessary to call upon them for assistance.

SEC. 5. The Councillor of any Council receiving such notice shall immediately call a special meeting to take action upon it, and a two-thirds vote of such meeting in favor of the aforesaid movement shall be binding upon all members of the Council.

SEC. 6. Any member found guilty of a violation of the Constitution, or of his duties to the Association, may be expelled therefrom by a two-thirds vote of the Council to which he belongs.

SEC. 7. A majority vote shall be binding upon a Council in all cases, unless otherwise provided in this Constitution.

SEC. 8. Whenever action shall be taken by any Council bearing upon the general interests of the Association, a copy of the resolutions adopted shall be forwarded to the Councillor of each Council; and, should the nature of the business require it, he shall notify the Supreme Councillor of the action taken upon it by the Council over which he presides.

SEC. 9. This Constitution may be amended by a vote of two-thirds of the whole number of Councils.

SEC. 10. This Constitution shall take effect on and after the fifteenth day of January, 1872.

ECONOMIC ELECTRIC PILE.—M. Gaiffe has recently introduced to notice a new electric pile, devised by him with a special view to its universal cheap production. It resembles in form Callaud's cell, which has been employed for some years on telegraph lines but the elements are different. The poles are rods of lead and zinc, immersed in a 10 per cent. aqueous solution of ammoniacal chlorhydrate, contained in a suitable vessel. The zinc rod is only half the whole depth, whereas the lead rod reaches to the bottom, where there is a layer of saline oxide of lead (minium). The electro-motive power of this pile is about one-third of that of a Bunsen couple; its internal resistance is small and little variable, as the chloride of zinc formed does not sensibly change the conductibility of the exciting fluid; its constancy is great; and finally the cost is merely nominal, when the circuit is open.

M. MORIN'S ELECTRIC PILE.—This has been designed by the inventor to obviate the inconvenience resulting from the deposit of zinc, on the copper or on the porous vessel, that takes place in the ordinary sulphate of copper pile. A zinc cylinder is placed concentrically within a copper cylinder, and the latter is surrounded by a cylinder of filter-paper, replacing the porous cell. Between the copper and the paper is placed some rather hard sandstone, and flour of sulphur between the copper and the zinc. The element is immersed in a solution of sulphate of zinc, which penetrates the mass through minute perforations in the copper. Elements thus prepared have been in effective use during twenty months without supervision or attention, and are said to be capable of serving for as long again.

THE manufacture of the new submarine telegraph cable for the existing lines, is progressing rapidly. It is to be laid by the steamship Great Eastern during the Summer of 1873. The route will be from Land's End, in England, to Halifax, Nova Scotia, and thence by cable direct to New York.

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FOREIGN TELEGRAPHIC ITEMS

SUBMARINE TELEGRAPH.—A dividend has been declared for the half-year at the rate of 15 per cent. per annum. The securities belonging to the company in the joint reserve fund, amounting to £31,693, have been transferred into the names of the trustees of the undertaking, and the proportion of reserve fund belonging to the "Société Carmichael et Cie," has been transferred into the names of their gérants.

MEDITERRANEAN EXTENSION TELEGRAPH.—The usual half-yearly dividend has been declared on the 8 per cent. preference stock, less income-tax, and a dividend at the rate of 3 per cent. per annum on the ordinary share capital, free of income-tax.

POST OFFICE TELEGRAPHS.—The total number of messages forwarded from Postal Telegraph Stations in the United Kingdom during the week ending August 17th, 1872, was 329,478, and during the corresponding week of 1871, 260,504, showing an increase in the week of 1872, on that of 1871, of 68,974, messages.

AN Act has been printed and passed at the close of the last session (35 and 36 Vic., Cap. 83) to extend the provisions of the Pensions Commutation Act, 1871, to officers and clerks of Telegraph Companies who are entitled to annuities. The statute is to apply to the officers of companies whose undertakings have been purchased by the Postmaster General

AN official communication from the Administration of the Russian Telegraphs gives notice that the twelve versts of telegraph wires recently destroyed by the inundations between Ustkara and Gorlitza, on the route to China, have been provisionally repaired; but that the telegraphic correspondence beyond Gorlitza will continue for the present to be forwarded by steamers, because further up, in the direction of Anikino, the line could not yet be repaired, as the country is still under water.

COURTING BY TELEGRAPH.

The report of Mr. Scudamore, the Director of Postal Telegraphs in Great Britain, is not exactly a novel, and yet it contains a romance of the newest and most original description. After saying how successful he has found the system of employing male and female clerks together, and how much the tone of the men has been raised by the association, and how well the women perform the checking or fault-finding branches of the work, he goes on to speak of friendships formed between clerks at either end of a telegraph wire. They begin by chatting in the intervals of their work, and very soon become fast friends. "It is a fact," continues Mr. Scudamore, "that a telegraph clerk in London, who was engaged on a wire to Berlin, formed an acquaintance with, and an attachment for"—mark the official style of the language—"a female clerk who worked on the same wire in Berlin, that he made a proposal of marriage to her, and that she accepted him without having seen him. They were married, and the marriage resulting from the electric affinities is supposed to have turned out as well as those in which the senses are more apparently concerned." Nor must the prudent reader run away with the idea that these young persons were very rash, or that they married without due acquaintance. For it is a fact that a clerk at one end of a wire can readily tell, by the way in which the clerk at the other end does his work, "whether he is passionate or sulky, cheerful or dull, sanguine or phlegmatic, ill-natured or good-natured."

COMPARATIVE TESTS OF INSULATORS.

Date.	Time.			Resistance per Insulat'r		Humidity.	Temperature.	Remarks.
				Glass.	Pond.			
1872.				Meg-ohms.	Meg-ohms.			
July 25.	11	15	a.m.	189	210	94°	70°	Raining about 10 minutes.
"	12	05	p.m.	136	290	"	"	Raining
"	2	55	p.m.	80	140	"	"	Very hard rain 10 minutes.
July 29.	12	00	m.	72	400	70	80	Hard rain 10 min.
"	12	30	p.m.	100	250	"	"	Drizzling.
Aug. 28.	2	00	p.m.	640	1840	95	69	Commenced mist
"	4	30	p.m.	24	1100	"	"	Heavy mist.
Sep. 11.	12	17	p.m.	7	60			

The Glass Insulators used in all these tests are the same. They have been exposed constantly since July 20.

The Pond Insulators of July 25 and 29, were exposed at same date with the glass, while those in test of Aug. 28 are of the improved form now adopted by the manufacturers, and had been, at the date of this test, exposed but about 12 hours, and probably show a higher test from their cleanliness. They were carefully wiped before being put on the frame. Otherwise the conditions of exposure are precisely alike.

These tests are only valuable as giving comparative figures, and not absolute units of resistance.

The tests of September 11th were made during a heavy rain, which had continued constantly for nearly two days. The Glass and Pond Insulators were put up at the same time.

Lines insulated with glass were working very hard, while those of the same length insulated with the Pond Insulator worked well.

LIABILITY OF TELEGRAPH COMPANIES.

An important legal decision was announced at the last term of the law court in this district, which settles the law in this State as to the liability of telegraph companies to their employers in case of failure to transmit or deliver messages. As the case (George W. True *et als.* against International Telegraph Company) is of novel impression in our courts and of interest to the public, we give a brief statement of facts. In 1870, George W. True & Co, of this city, sent a dispatch to their correspondents in Baltimore, accepting an offer of a cargo of corn at a given price and freight. The offer had been made by telegraph the same day, and the reply was sent on a "night blank" of the International Telegraph line at the usual night rates. The dispatch, on account of the carelessness of some operator on the line west of Boston, was not duly forwarded, and True & Co. failed to secure the cargo of corn. As the market price of corn and freights advanced immediately, they were obliged to buy other corn to meet the wants of their business at a price largely in advance of that offered. A claim was immediately preferred against the telegraph company for the damage resulting from their failure to promptly transmit the message to its destination, which was resisted by the company on the ground that one of the conditions printed on their "night blanks," subject to which the message was sent, was that the telegraph company should not be liable, in case of failure to deliver the message, to an amount greater than the sum paid for its transmission —in this case, forty-eight cents. Suit was therefore brought to recover special damages; the case was argued July, 1870, and has been under consideration two years; the court has now rendered a decision in which the claim of the plaintiffs is sustained in full.

The ground of the decision was that, although telegraph companies may establish reasonable rules for the conduct of their business, they cannot by printed notices on their blanks relieve themselves from the liability which the law imposes on them from motives of public policy; that the courts are to determine in the last resort whether the rules and limitations prescribed by the company are reasonable, and that the condition set up in defense in this was not binding upon the plaintiffs, as it attempted to relieve the telegraph company from all liability (beyond the amount paid for the message), whether arising from carelessness, accident or wilful default of the company and its servants. The measure of damage was declared to be the difference between the price of the cargo offered and of that bought to supply its place, with the additional freight.—*Portland (Me) Press.*

RECEIPTING FOR TELEGRAMS.

At the meeting of the Board of Trade last Saturday night the following resolution was adopted:

Resolved, That the delegates of this Board to the National Board of Trade be instructed to use all proper efforts to have such action taken at the ensuing session of the National Board as may, in the opinion of the members thereof, be necessary to influence the various telegraph companies of this country to receipt to the senders of telegrams for messages sent and money paid therefor, and to require the different companies to distribute and publicly post their private tariff rate at their various offices.—*Cincinnati Times.*

TO RENDER METALS ELECTRIC.—T. Sidot has observed this phenomenon, and found that iron, silver, and aluminium, if the friction be sufficient, will give off electric sparks. To perform this experiment, take a perfectly dry tube of thick white glass and put in 15 to 20 grammes granulated silver, and 30 to 40 grammes pure bisulphide of carbon, and seal up the tube. On warming the tube slightly and shaking it in the dark, sparks appear in the interior, their number increasing with the violence of the agitation. The sparks disappear on immersing the tube in water.

M. BOUMAN, of Holland, has effected a considerable improvement in the arrangement of the Leclanche battery, which renders it still more constant. It consists of a plate of carbon and an amalgamated zinc rod covered with woollen cloth, placed vertically in a glass jar, which is two-thirds filled with the mixture employed for this description of battery, namely, coarsely powdered carbon and peroxide of manganese. The contact with the carbon is made by cutting a slit in the carbon, and inserting a platinum wire, which, it is stated, establishes a good connection. Excellent results are stated to have obtained from this variation.

AN instrument has been invented in Germany which will measure with perfect accuracy the heat of the hottest furnace. It is based on the principle that the resistance of pure metals to the electric current increases with the temperature in a very simple ratio. A platinum wire of known resistance is coiled around a cylinder of fine clay, and covered with a tube of the same material. The test is a Daniells battery of two cells, and with a resistance measurer, and placed in the furnace whose temperature is to be ascertained. It is then only necessary to read off the indications of temperature on the graduated resistance measure.

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CORRESPONDENCE.

LETTER FROM MR. J. D. REID.

Observations upon the Telegraph Systems in Europe.

EDINBURGH, Aug. 20, 1872.

To the Editor of the Journal of the Telegraph.

I said nothing of telegraphs in my last, because my journey has been largely an escape from them. The telegraph to me is the memory of twenty-seven years of toil, which have not passed without leaving their marks upon me. These I have been rubbing out, and with much success. I have gained flesh and vigor, and approach new duties with gayety and youth.

The telegraph lines in the north of Switzerland disappointed me. They looked like the earliest American telegraphs: slim poles, an iron rim round the top (which, by the way, I was the first to use, and the utility of which I now question), and a glass insulator of the old ink-horn fashion, on an iron pin. The wire was small and unzinced. Yet the poles were all very straight, and in good order. The iron pole is quite a feature, and is neat and serviceable. They are simple rods, averaging from ten to twenty feet long, seldom the latter, and bear from three to ten wires. I see not why, with a good foundation of a single square stone or block of black locust, they could not be economically introduced on some American roads. In lower Switzerland, the new lines show evident care and regard for permanence. The poles are larger, all very straight, and wherever the least curve occurs a second pole is planted in rear of the wire-bearer, and is made to lean against and keep it straight by securely bolting thereto. This is done at every deviation from a straight line. A new insulator is used there made of porcelain, having the iron shank depending on which the wire rests, and so formed that they have two lugs through which spikes pass, which fasten them to the poles. The hook is a simple wire, on which the line-wire rests without fastening, which is only done about every ten poles, on an insulator borne by a bracket. The new wires are all coated and somewhat larger, although I think only for international wires.

On my way through the country I had sometimes occasion to telegraph, and was always pleased with the neatness of the stations and the civility of the attendants. Some of the stations are at the smallest places, evidently for the accommodation of occasional travellers or for line police. In every case the machinery was carefully excluded from sight, and approach to it guarded. Almost all the operators I met were young women, who fortunately understood my mangled French, but were ignorant of English. I enclose you one or two specimens of messages I received from Strasbourg and Zurich, at which latter place I had the ill fortune to be robbed while bathing in the lake, at the close of an intensely hot day. My answers were usually received promptly, and I have no question of the efficiency of the general service. The chief officer at Bern is a most careful and obliging person. I noticed nothing remarkable in the detail of duty, except a prevailing cleanliness and courtesy which might have been instinctive, or the reflection of authority, or both. These are cheap but most attractive appendages to any office, and which our American offices are more and more attaining.

Throughout France, Belgium, and Germany, as well as through Great Britain, the lines are all carefully built, and sometimes the poles bear an enormous multitude of wires. The insulators on the continent are almost universally of porcelain, of large size, to which the wires are bound, except where the new lugged insulator is used. In England and Scotland the insulators are largely of vitrified earthenware, but of the same form as the porcelain. In Great Britain every pole is guyed by iron cords, to preserve it from falling or losing its upright position. I was surprised to find the covered wires which pass through the long underground railroads of London simply hung loosely and all together on a single nail driven into the wall. Sometimes a dozen are thus suspended. I cut the following from a morning paper, which may serve as an item for you:—

"FIGURES IN TELEGRAMS.—A new rule in regard to figures in telegraphic messages came into operation on the 1st inst., to which it is desirable the attention of the public, and especially of business men, should be directed. The transmission of figures by telegraph has always been a difficulty. Despite the regulation of the postal department that '365' should be held as written thus: 'Three hundred and sixty-five,' and counted as five words, the public cannot be got to write the figures in words at length. The new rules are in general such that the sender of a message will gain by directing his figures to be sent in words. Thus, the word 'first,' when written so, must, according to the rule that any word in Johnson's Dictionary is to be accepted as one word, be charged single. But if the sender of a telegram writes it '1st,' this is to be counted as two words. In the same way '13th' is to be counted as three, because in that form the telegraph clerks must send it 'one, three, th.' But the sender can write 'thirteenth,' and in this way, we assume, it must pass as one word. In the same spirit the new rule affects fractions, for while 'three-fourths,' when so written, are unmistakably chargeable as two words, the regulation counts it as three when written '¾,' the bar of division in this form requiring a special signal. Again, '12.35' (as applied to a train) will be charged five words in that form, but if written 'twelve thirty-five,' only as three. In the form of words, the meaning can generally be as accurately conveyed, and as there is an actual saving in the adoption of that form, we have no doubt the new regulations adopted by the post-office will have the effect of reducing the use of figures and fractions in telegraph messages."

I observe a new regulation also, which, whatever it does not do, certainly saves time, and either increases the messengers' gains or reduces the cost of service. Where I sit the business is largely done by telegraph, and requires great promptness. The department has, at its own expense, and without request, procured printed envelopes bearing the firm's address, and messages are delivered *without receipts*. The boys rush in with a message, slap it on the counter, and are off. I intend to inquire about this, and write you about it after I return.

Yours truly, J. D. REID.

To the Editor of the Journal of the Telegraph:

I desire to avail myself of the medium of your paper to lay before the members of the Telegraphers' Insurance Association a proposition which, it seems to me, would, if adopted, tend greatly to the benefit of that institution. It is that its headquarters be removed to some western city.

It is a fact that an undue proportion of membership is at present contained in and about New York. Telegraphers throughout the west and south manifest comparatively little interest in the affairs of the Association. This, I believe, is due more to their being so far removed from the headquarters of the Association than to any other cause. Sectional feelings may possibly also have an effect. At all events it cannot be doubted that the selection of well known telegraphers resident at some central point in the west, as officers of the Association, would tend to awaken an interest where it has not previously existed.

But a short time intervenes between this and our next annual meeting, but it is sufficient for a full consideration of the subject and the forming of a wise decision. To this end it would be desirable that such of the members as feel enough interest in the subject, should express their views through the columns of the JOURNAL.

A NEW YORK MEMBER.

AUSTIN, Texas, August 7, 1872.

To the Editor of the Journal of the Telegraph:

A question arose to-day as regards the correct way of counting N. O. or N. Y. Party who brought message to office read it to the receiver, explaining the fact that N. O. meant New Orleans. The message read: "Let me know what you heard from N. O., &c. I don't feel like going there," evidently meaning a place. I referred to page 10 of the Rules, claiming it one word. No delay occurred but merely the question of the correct method of counting N. O., receiving operator claiming that receiver has no right to know whether N. O. meant New Orleans, not even though it was so explained by sender. Please answer.

OPERATOR.

Answer.—A rule cannot be framed which will cover every case which might arise, and with which it appears to be connected. At such times common sense comes into play, of course keeping in harmony with the spirit of the order. In this case, as the abbreviation of N. O. for New Orleans was understood by the receiver, it was correct to count it as one word. In another connection it might have been right to have counted it as two words. The operator receiving the message, however, had no right to dispute the accuracy of the check after having been informed by the sending operator of the manner in which it was counted. Authority is frequently assumed by receiving operators in cases of this character to refuse business unless their peculiar ideas of right is conformed to, and thereby delay to business is sometimes occasioned. This is wrong; and in this connection we quote, for general information, the rule which governs service of this nature:

"Rule 20. In order to prevent delay in the transmission of messages, arising from differences of opinion as to their proper route or mode of counting, the sending office will select the wire over which its business shall be sent, and decide as to the number of words contained in the names of places and things or in compound words.

"No office shall refuse to receive and forward or deliver any message from any other office, unless it should endanger life or property, in which case the receiving office will hold such message until advised by the District Superintendent.

"If any message is improperly sent or counted, the Manager of the receiving office will immediately notify the District Superintendent."

HARTFORD CITY, Ind., Sept. 9, 1872.

To the Editor of the Journal of the Telegraph:

Please tell me through the columns of the JOURNAL, how many words in the following message:

"Will pay thirty-four on track for your wheat. Answer. Detroit. R. M. SMITH.
For JAS. B. JONES."

All of the above signature was transmitted.

Answer.—There are fifteen words. The four words after the signature R. M. Smith, should be counted.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory and Province on the Continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

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Address—

JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, SEPTEMBER 16, 1872.

EVIDENCES OF INTEREST TAKEN IN THE JOURNAL.

It is exceedingly gratifying to observe the great interest which is springing up among the operators in all parts of the country in all matters relating to practical telegraphy, and especially to note the interest which they manifest in the Journal. We have aimed to present in every issue of the paper useful and instructive articles relating to the most important branches of the service which should be the means of assisting those who have a desire to learn to reach positions where their services would be of more value to the Company and of profit to themselves. We have believed that the telegraphic field was not only broad, but that it contained a rich and fruitful soil; and if good seed was sown upon it, it would yield a good and abundant harvest. This harvest has begun sooner than we anticipated, and promises to be much more abundant than we could have hoped. Every day we are in receipt of communications relating to the science or business of telegraphing, from operators in all parts of the country, testifying to the great interest which they take in our efforts to instruct and benefit them. These evidences of appreciation are very acceptable, and we are very glad to receive them. It is evident that the good will and interest so freely tendered to the employés of the Company by the possession of an able journal devoted to their service is being not only appreciated, but that there is a desire to reciprocate by a service in kind, which is manifested by the numerous valuable communications made to the Journal.

Quite recently we have had occasion, in answering correspondents, to decide certain questions which arose in the ordinary course of business, and which seemed to be not generally understood. Some of these decisions have been misapprehended, and it has been gratifying to us to receive communications from those who supposed we were wrong, setting us right. Our thanks are due to these vigilant guardians of the reputation of the Journal.

Had we space we would publish every letter; but as this is not practicable, we must be content to refer to them. Our esteemed correspondent, Savannah, is mistaken in supposing we counted "half past" one word and P. M. two words in the following message: "Your sister-in-law died at half past five this P. M. Answer." He is quite correct in saying that sister-in-law is properly counted as one word, its legitimacy being established by the best authorities, and that half past is not one word, any more than is quarter past or three quarters past, none of which are recognized by Webster. The hyphen between the words half and past was a typographical error. We think Savannah is correct in saying that etc. should be counted as one word on the ground of usage. Our guide in the matter of counting is the book of rules and Webster's Dictionary. Any word found in the latter is to be transmitted as one word.

Our reply to the question in the Journal of any 15th, whether the sender of a red message can have it repeated back upon the payment of one half of the amount of tolls charged for sending the message, must be changed from the affirmative to the negative. In the conditions for repeating back, as printed on blank No. 2, it is provided that for repeating, one half the regular rate is charged in addition; but the rate charged on red messages is not the regular rate, but one half the regular rate, and it would be manifestly improper to assume the responsibility of a repetition of the red message for one quarter the regular tolls. The Company assumes no responsibility for red messages, and cannot, therefore, repeat them back nor insure them.

If a party sending a red message desires the signal 34 to accompany it, he must pay one half the usual day rate for this extra service—that is to say, one full day rate for the red message and the answer. The receiving office should return the answer just as soon as the message has been delivered to the party addressed.

No United States official, whether attached to the Post-office or any other branch of the public service, has any right to send messages free over the wires of this Company unless he possesses a duly authorized pass or frank. Hampton should have referred the matter at once to his Superintendent. The operator who received the message from the Post-office clerk showed a great lack of knowledge and discretion in receiving it as a free message on the assertion of the Postal railway clerk that it was entitled to go free. Whenever the government business is to be sent free over the Western Union lines there will be due notice from the officers of the Company, and until this is issued the assertions of Postal railway clerks that their messages are to be sent free may be safely disregarded.

Whenever any operator is known to make improper use, by his superior or other person, of any information contained in a message received at or transmitted from his office, he will be derelict in his duty, and really accessory to the dishonest use of the information, if he does not promptly notify his Superintendent of the fact. Such use of information is just as wrong as the appropriation of property which does not belong to you, and should be reported as quickly as that of a theft.

It will be seen by referring to the accompanying executive order that the restriction upon the delivery of red messages until the day following their transmission is removed, and that such messages, when called for by the persons to whom they are addressed, may be delivered to them the same night upon payment of the difference in rates. The Company does not agree to send them until night or the next morning, and does not agree to deliver them until the next day, but in cases where the business is such that they can be sent the same night, and parties come to the office for them, they may be delivered to them.

An operator should never send red messages over any circuit before all regular full-rate messages belonging to such circuit have been transmitted. Full-rate messages must always be got off before the half-rate business is sent.

In another column we print a communication from a prominent member of the Telegraphers' Life Insurance Association, suggesting the removal of the headquarters of the Association to some central point in the West. The conclusions which prompt this suggestion have been arrived at after much deliberation among the more active members in this section, and are believed to be essential to the growth and continued prosperity of the Association.

We can say but little to add force to the ideas expressed by our correspondent, and that must, for obvious reasons, coincide entirely with his views. It appears very strange to us, and, doubtless, to our readers also, that, with at least ten thousand persons directly connected with our business, less than one-tenth belong to the Association and are in good standing, while of that number the greater proportion are in the immediate vicinity of its headquarters. Has sectional jealousy anything to do with this? We hope and believe not; but still the experiment of removal had better be tried.

The sentiment of charity upon which the institution was founded, long since passed away. Membership now is a matter of business. At this day it has become a recognized duty that a man should make provision for those dependent upon him, in the event of his being taken away. To say nothing of the pleasant feeling of brotherhood engendered by the Association, and the manifest favor and interest taken in its welfare by the officers of the Western Union Company, the fact is plain that this system of life insurance is the cheapest, and the form of assessment the least objectionable, of any that could be devised.

No one has an ax to grind in this institution. No one receives any of the funds except those who, by misfortune, become entitled to them.

In this view, the paucity of members is incomprehensible to us. There should be a membership of at least five thousand, to make it a real benefit and success; and it is in the hope of attaining these proportions that we advocate the suggestions which give rise to these remarks.

Let us have the views of each member of the Association. We will publish all that we can find room for.

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SUPPLEMENT--September 15, 1872.

The following is a list of changes, corrections, &c., in the printed matter of the New Tariff Book:

These changes should be entered neatly and correctly, and THIS *half of the Supplement returned as directed in Tariff Circular.*

ALABAMA.

NOTE.—No business for Other Line offices in Alabama, Georgia and Mississippi will hereafter be sent *via* Chattanooga, Tenn.

Atalla.....80 5 342 Meridian, Miss.
Auburn, closed.
Birmingham .... 75 5 342 Meridian, Miss.
Blakeley, closed.
Carthage..... . ..50 3 342 Meridian, Miss.
Collinsville.....90 6 "
Evan's Mill, changed to Evansville.
Eutaw.....50 3 342 Meridian, Miss.
Green Pond. .....60 4 "
Livingston... .....90 2 "
Notasulga, closed.
Springville.....75 5 342 Meridian, Miss.

ARKANSAS.

Huntersville, closed. Marianna, closed.

CALIFORNIA.

Modesto, now W. U. office.

DACOTAH.

Elk Point..... 45 5 463 Sioux City.
Fargo..... .....225 15 307 Chicago.
Fort Randall.....200 15 463 Sioux City.
Grand Forks.....200 13 307 Chicago.
Pembina.... .....225 15 307 Chicago.
Shyenne Crossing. ...200 13 307 Chicago.
Vermillion.... ..... 65 8 463 Sioux City.
Yankton.....100 10 "

DELAWARE.

Laurel, closed.

FLORIDA.

Fernandina.... .. ....125 11 198 Lake City, Fla.

GEORGIA.

See "note" under Ala.

Calhoun, closed.
Dalton, closed.
Morgansville .....100 7 342 Meridian, Miss.
Ringgold, closed.
Trenton. .....100 7 342 Meridian, Miss.

IDAHO.

Snake River, closed.

ILLINOIS.

Beckwith, closed.
339 Cairo, should be 329 Cairo.
E. St. Louis, ck. St. Louis, Mo.
French Village, closed.
Harlem, Cook Co., changed to Oak Park.
Jonesboro, chngd to Anna.
Lombard, changed to Lombardville.
Manica, should read Monica.
339 Mound City, should be 329 Mound City.
Nameoki, closed.
New Memphis, closed.
347 Norris, is in Fulton Co.
Opdyke, closed.
Tampica, should read Tampico.
Woodlawn, closed.

INDIANA.

NOTE.—No more business for other lines will be sent *via* Lawrenceburg, Ind.

Allen's, closed.
Bridgeport, ck. direct.
Knightsville, "
Patriot.....45 3 253 Aurora, Ind.
Rising Sun..... .....45 3 " "
Sunnyside, closed.
180 Valparaiso, should be 280 Valparaiso.
Williamsport, closed.

INDIAN TERRITORY.

Big Cabin Creek, closed.

IOWA.

Plymouth, now W. U. office, sq. 406.
377 Rome, is in Henry Co.

KANSAS.

Chapman's Creek, changed to Chapmans.
Divide, changed to Colony.

LOUISIANA.

Vermilion Bayou, closed.

MAINE.

Booth Bay, now W. U. Office, square 14.
Burnham, ck. direct.
Clinton, ck. direct.
Searsport, now W. U. Office, square 11.
Stockton, now W. U. Office, square 11.

MARYLAND.

67 Chestertown, now Other Line Office.....40 3 67 Townsend, Del.
Darlington, closed.
Easton, ck. direct.
Eckhart.....20 1 129 Cumberland, Md.
Frostburg ....20 1 " "
Kingston, closed.
Lonaconing .....20 1 " "
Mt. Savage.....20 1 " "
Ocean Mines.....20 1 " "
Westover, closed.

MASSACHUSETTS.

Framingham, ck. direct, square rate.
Monument, closed.

MEXICO.

600 Brownsville, Tex., in "Remarks" column, should read, 589 Brownsville, Tex.

Lines in Mexico are now open for business to offices whose "Tariff for Other Lines" from Brownsville, Tex., is four dollars or less.

MICHIGAN.

Huron, Monroe County, changed to Rockwood.

MINNESOTA.

Oak Lake, changed to Audubon.

MISSISSIPPI.

See "note" under Ala.

Brandon, closed.
Newton, closed.
Skugulak should read, Shugulak.
Toomsuba, now W. U. office, sq. 328.

MISSOURI.

Cunningham, closed.
Edgarton, closed.
Pilot Knob, closed.
Rankin, closed.

NEBRASKA.

Waverly is an Other Line office. Square number should be erased.

NEVADA.

Ploche City.....150 15 576 Salt Lake City, Utah.

NEW HAMPSHIRE.

So. New Market, ck. direct.
Old Orchard Beach, closed.
Ocean House, "
Farragut House, "

NEW JERSEY.

Barnegat, ck. direct.
Deal, closed.
Glen Gardner, ck. direct.
Hawthorne, closed.
Neshanic, ck. direct.
Norwood, closed.
Seaville, ck. direct.
Tuckerton, ck. direct, should be in sq. 43.
Weehawken, P. O. A. Weehawken, Hoboken P. O., N. J.
West End, ck. Jersey City.
Whitings, ck. direct.

NEW MEXICO.

Red River, closed.

NEW YORK.

NOTE.—Unless otherwise stated, Offices in squares 1 to 40, inclusive, 45 and 46 will add 15 cents to tariff to square 41, for rate to points on L. I.

Alden Station, changed to Crittenden, square 120.
Arcade .... 40 3 120 Olean, N. Y.
40 3 120 Buffalo, N. Y.
Cozzen's Hotel, W. Pt., ck. West Point, N. Y.
Dutchess Junc., now W. U. Office, sq. 46, ck. Fishkill, N. Y.
East Aurora ..... 40 3 120 Olean, N. Y.
30 2 120 Buffalo, N. Y.
Elma .... 45 3 120 Olean, N. Y.
30 2 120 Buffalo, N. Y.
Essex, closed.
Harford Mills, closed.
Holland ..... 35 2 120 Olean, N. Y.
35 2 120 Buffalo, N. Y.
Lebanon Springs, closed.
Locke, closed.
89 Mayville should read 139 Mayville.
Overlook Mtn. House.....35 2 40 Roundout, N. Y.
Protection..... 30 2 120 Olean, N. Y.
35 2 120 Buffalo, N. Y.
Rosendale, now W. U. Office, square 46.
Schaghticoke, ck. Harts Falls, N. Y.
45 Spring Valley should read 46 Spring Valley.
South Wales.....35 3 120 Olean, N. Y.
120 Buffalo, N. Y.
West Danby, closed.
Woodstock.....35 2 40 Rondout.
Yorkshire Centre..... 25 2 120 Olean, N. Y.
45 3 120 Buffalo, N. Y.

NORTH CAROLINA.

116 Kittrell's, should read 115 Kittrell's.
104 Warrenton, " " 105 Warrenton.

NOVA SCOTIA.

Hillsburg, changed to Bear River.

OHIO.

Alma, Henry Co., changed to Deshle.
Belpre, closed.
Berlin Square, changed to Ceylon.
Calhoun, changed to Windham.
221 Liberty, is in Henry Co.
New Hope, closed.
Townsend, changed to Collins.
Windham Station, changed to Mahoning.

PENNSYLVANIA.

94 Aqueduct, P. O. A. Duncannon, Pa.
Armstrong Run, closed.
Bigler, Clearfield Co., P. O. A. Williams Grove, Pa.
Cashup, closed.
Eagle, P. O. A. Spread Eagle, Pa.
East Foxburgh, closed.
Fullerton (other line office), is in Lehigh Co.
Hawley, now W. U. office, sq. 46.
Harmsburg, closed.
Julian, P. O. A. Julian Furnace, Pa.
Lackawanna and Bloomsburg Jn., P. O. A. Pittston, Pa.
Logan Iron Works, Juniata Co., P. O. A. Lewistown, Pa.
Milford.....20 2 46 Pt. Jervis, N. Y.
Montrose is an Other Line office, erase sq. number.
Osceola, P. O. A. Osceola Mills, Pa.
Perrysville, P. O. A. Port Royal, Juniata Co., Pa.
Petersburg, Huntingdon Co., P. O. A. Shavers Creek, Pa.
Phillipsburg, Clarion Co., closed.
Pine Grove, Warren Co., changed to Russellburg, Pa.
Rockville, P. O. A. Susquehanna, Dauphin Co., Pa.
Rockdale is in Delaware Co.
Sandy Ridge, P. O. A. Powelton, Centre Co., Pa.
Snow Shoe Intersection, P. O. A. Milesburg, Pa.
Steamboat, changed to Glen Loch.
Sugar Notch....25 2 66 Wilkesbarre, not Manch Chunk.
Wampum, closed.
West Chester Intersection, P. O. A. Paoli, Pa.

RHODE ISLAND.

Tiverton, closed.
Washington, P. O. A. Coventry.

SOUTH CAROLINA.

Greenville.....85 6 164 Columbia, S. C.

TENNESSEE.

Sewanee.....50 3 265 Cowan, Tenn.
Tracey City.....50 3 " "

TEXAS.

Highland, closed.
Keechie, closed.
Port Lavaca, closed.

VERMONT.

Richford, now W. U. Office, square 30.
Sheldon, now W. U. Office, square 38.

VIRGINIA.

Acquia Creek, closed.
Covington, now an Other Line Office.....65 4 96 Richmond, Va.
Dublin, closed.

WEST VIRGINIA.

Barboursville.. 65 4 133 Greenbrier, W. S. S., W. Va.
85 2 203 Huntington, W. Va.
Big Bend Tunnel..... 40 3 133 Greenbrier, W. S. S., W. Va.
65 4 203 Huntington, W. Va.
Charleston, Kanawha Co..... 65 4 133 Greenbrier, W. S. S., W. Va.
50 3 203 Huntington, W. Va.
Coalburg..... 65 4 133 Greenbrier, W. S. S., W. Va.
50 3 203 Huntington, W. Va.
Mannington, closed.
Miller's Ferry.. 60 4 133 Greenbrier, W. S. S., W. Va.
60 4 203 Huntington, W. Va.
Richmond Falls 50 3 133 Greenbrier, W. S. S., W. Va.
65 4 203 Huntington, W. Va.
St. Albans..... 65 4 133 Greenbrier, W. S. S., W. Va.
40 3 203 Huntington, W. Va.
Stretchers Neck 50 3 133 Greenbrier, W. S. S., W. Va.
65 4 203 Huntington, W. Va.

HALF RATE OFFICES.

(*Page* 254.)

Erase from list of Half Rate offices, on page 254, all offices in Florida except Pensacola.

Erase note, at foot of page 254, relating to Half Rate business for Montreal.

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The following is a list of names of new offices and others not in the list of the New Tariff Book. *Enter them neatly and correctly in the Book, and preserve this list for reference.*

ALABAMA.

304 Bellevue.
305 Canoe Station.
305 Evansville.
* Shelby Iron Works.....50 5 294 Columbiana, Ala.
* Valley Head.....90 6 343 Meridian, Miss.
293 Madison.
304 Macon Station.

CALIFORNIA.

Bridgeport.
* Big Oak Flat..... ..... 75 35 Sonora, Cal., ck. San Francisco.
Cloverdale.
Gallatin.
Twilocks.

COLORADO.

557 Black Hawk.

CONNECTICUT.

29 East Lyme, P. O. A. Nyantic, Conn.
40 East Canaan.
32 Norfolk.
* Chester.....30 3 32 Hartford, Conn.
* Cromwell.....30 3 " "
* Edgecomb House, Groton, Conn.25 2 29 N. London, Conn.
* New Saybrook.....30 3 32 Hartford, Conn.
37 Thomaston.
25 Thompson.

DACOTAH.

* Big Coolie.....200 13 307 Chicago.
* Fort Scully.....300 20 463 Sioux City, Iowa.
* Little Coolie.....200 13 307 Chicago.

DELAWARE.

67 Newport.

FLORIDA.

* Palatka.....100 6 198 Lake City, Fla.

GEORGIA.

196 Barnett.
187 Blackshear.
226 Conyers.
237 Jonesboro.
206 Washington.

IDAHO.

580 Stoner Station.

ILLINOIS.

328 Altamont.
329 Anna.
349 Bridgeport.
328 Beecher City, Effingham Co.
298 Beecher, Will Co.
327 Belle Flower.
327 Clinton.
336 Cazenovia.
337 Cornland.
329 Cobden.
327 DeWitt.
348 Edwardsville Crossing.
329 Eldorado.
327 Ellsworth.
319 Fairfield.
298 Frankfort.
308 Gibson.
298 Grant, Kankakee Co.
319 Grayville.
307 Grand Crossing.
329 Harrisburg.
308 Hoopston.
348 Irving.
358 Literberry.
308 Loda.
308 Lovejoy, Iroquois Co.
336 Lafayette.
308 Melvin.
298 Momence.
300 Mt. Carmel.
308 Milford.
347 Mapleton.
319 Mill Shoals.
357 No. Henderson.
319 Norris City, White Co.
357 Osco.
307 Oak Park.
358 Pleasant Plains.
298 Papineau.
337 Rochester.
310 Ridgeway.
308 Roberts.
298 St. Ann.
298 St. Mary.
357 Spring Grove.
329 Tunnel.
318 Tuscola.
336 Toulon.
338 Tilden.

INDIANA.

281 Avon.
271 Arcadia.
289 Atkinson.
289 Boswell.
253 Batesville.
288 Burdick.
289 Colfax.
261 Corunna.
299 Clinton.
261 Denver.
289 Earl Park.
271 Frankfort.
289 Fowler.
289 Koutts
289 Montmorency.
299 Montezuma.
283 Milton.
299 Newport.
299 Perrysville.
288 Ross.
300 St. Francisville.
252 Shiedler.
299 Seeleyville.
298 Shererville.
289 Templeton.
299 Waveland.
270 Warrens.
288 Whitings.
281 Whitestown.

INDIAN TERRITORY.

509 Atoka.
477 Chateau.
468 Ft. Gibson.
468 Gibson's Station.
478 McAllister.
478 Ream's Stock Yards.

IOWA.

426 Ashewa.
366 Albin.
356 Bellevue.
436 Bedford.
397 Comstock.
407 Colo.
377 Cone.
436 Conway.
455 Ex-ex.
356 Epworth.
397 Ely.
417 Garden Grove.
367 Hale.
366 Harper's Ferry.
417 Leon.
366 Lansing.
397 Mt. Sterling.
366 No. McGregor.
377 Port Allen.
367 Rome, Jones Co.
397 Shocks.

KANSAS.

502 Blue Rapids.
457 Colony.
447 DeSoto.
456 Doniphan.
525 Great Bend.
457 Godfrey.
456 Grasshopper Falls.
447 Hilledale.
518 Hutchinson.
465 Iowa Point.
525 Larned.
467 Oswego.
521 Raymond.
518 Sedgwick City.
465 St. Francis.
518 Wichita.
465 White Cloud.

KENTUCKY.

283 Newport.

LOUISIANA.

875 Kenners.
884 Tangipahoa.

MAINE.

17 Biddeford.
6 Danforth.
20 Fryeburg.
17 Kittery.
10 Kingsman, ck. Bangor.
11 Lincolnville.
10 Orono, ck. Bangor.
20 Sebago Lake.
20 West Baldwin.
10 Winn, ck. Bangor.
17 York.

MARYLAND.

60 Greensboro.
67 Hopewell Cross Roads.
67 Marydell.
* Kennedyville.....30 2 67 Townsend, Del.
* Massey's Cross Roads....25 2 67 Townsend, Del.
122 Mt. Savage Junc.
85 Phœnix Station.
60 Ridgely.

* Other Line offices.

MASSACHUSETTS.

21 Bayview.
25 Brookfield.
21 Braintree.
18 Cohasset Narrows.
28 Deerfield.
21 Danvers.
25 East Brookfield.
25 East Douglass.
21 Essex.
18 East Stoughton.
18 Holbrook.
18 Hanson.
* Norton.....25 2 18 Taunton, Mass.
21 Marshfield.
18 Mattapoisett.
28 No. Leominster.
18 No. Abington.
18 Plympton.
21 Peabody.
21 Scituate.
25 Southbridge.
28 Shirley.
18 So. Weymouth.
21 Somerville.

MICHIGAN.

127 Cheboygan. Tariff to sqn. 127 is 20 cents, and to 128 10 cents more than to sq. 147.
128 Crawford's Quarry.
210 Elba.
270 Edwardsburg.
147 Greenbush.
270 Marcellus.
127 Mackinaw City.
260 Middleville.
231 No. Adams.
148 Oscoda.
240 Rives Junc.
270 Robinson.
211 Rockwood.
260 Saugatuck.
211 Waltz.

MINNESOTA.

Amounts given are Tariffs for Other Lines from Chicago.

* Aldrich	150	10	* Kimberly	150	10
* Anthon	150	10	* Lake Side	200	13
* Audubon	200	13	* Motley	150	10
* Chaska	100	7	* Moorehead	200	13
* Campbell	150	10	* Mountain Lake	150	10
* Carver	100	7	* Perham	150	10
* Claremont	100	7	* Sauk Centre	150	10
* Clear Lake	125	8	* Sioux City Junc.	100	7
* Georgetown	200	13	* Thomson	150	10
* Glyndon	200	13	* Wadena	150	10
* Hawley	200	13	* Withington	150	10
* Island Lake	150	10			

MISSISSIPPI.

374 Bogue Chitto.
363 Byram.
384 McComb City.
363 Terry.

MISSOURI.

389 Auxvasse.
428 Aullville.
437 Atchison Junc.
446 Bolckow.
447 Belton.
456 Blocks.
428 Brownsville.
448 Carthage.
428 Concordia.
389 Cedar City.
456 De Kalb.
418 De Witt.
389 Fulton.
359 Hematite.
437 Higginsville.
370 Ironton.
427 Jamesport.
409 Palestine.
455 Pickering.
456 Platte City.
427 Spickards.

MONTANA.

* Gallatin.....100 7 584 Helena, Mont.

NEBRASKA.

518 Alexandria.
513 Fairbury.
* Beatrice.....105 7 474 Plattsmouth, Neb.
* Dewitt.....95 7 "
* Juniata.....155 10 "
* Lowell.....165 11 "
* Kearney Junction.....135 9 "
465 Salem.

NEVADA.

* Bullionville.....150 15 576 Salt Lake City, Utah.

NEW BRUNSWICK.

3 Aulac.
* Caraquette.....30 2 3 Sackville, N. B, Mont. Co.
* Clifton.....30 2 " "
* Pokemouche.....30 2 " "
* Shippegan.....30 2 " "
* Tracadie.....30 2 " "

NEW HAMPSHIRE.

24 Henniker.
20 No. Conway.
* East Wakefield.....25 2 17 Great Falls, N. H.
* Ossipee.....25 2 " "
* Wakefield.....25 2 " "
* West Ossipee.....25 2 " "
27 Waumbeck House, Jefferson, Summer Office.

NEW JERSEY.

52 Broadway.
47 Coalport, ck. Trenton, N. J.
47 Englishtown, ck. Jamesburg, N. J.
41 Menlo Park.

NEW YORK.

74 Camillus.
65 Coventry Station.
57 Clayville.
74 Cato.
120 Crittenden.
29 East Hampton, L. I.
83 Factoryville.
92 Fair Haven.
130 Falconers, ck. Jamestown, N. Y.
41 Glen Cove, L. I.
120 Grimesville.
45 Hart's Falls.
* Black Rock.....20 2 120 Buffalo, N. Y.
* Franklinville.....25 2 120 Olean, N. Y.
45 3 120 Buffalo, "
* Ischua.....20 2 120 Olean, "
50 3 120 Buffalo, "
* Lake Mohonk.....25 2 46 New Paltz, N. Y.
* Mooresville.....45 3 40 Rondout, "
* Machias.....25 2 120 Olean, "
45 3 120 Buffalo, "
* Margaretville.....40 3 40 Rondout "
* Moriah Centre.....25 1 39 Whitehall, N.Y., Mont. Co.
* Russia.....25 1 57 Utica, N. Y., Mont. Co.
* Stamford.....45 3 40 Rondout, N. Y.
139 Laona.
74 Minetto.
36 No. Hoosick.
57 No. Brookfield.
41 Oyster Bay, L. I.
36 Petersburg, P. O. A., No. Petersburg, N. Y.
41 Roslyn, L. I.
92 Shortsville.
41 Sparkill.
74 So. Granby.
57 Washington Mills.
130 Workesburg.

NORTH CAROLINA.

87 Garysburg.

NOVA SCOTIA.

5 Bear River.

OHIO.

181 Ava.
201 Brownhelm.
201 Ceylon.
201 Collins.
181 Caldwell
159 Mahoning.
181 Mackeburg.
151 Martin's Ferry.
211 Martin.
211 Oak Harbor.
221 Deshle.
241 Emerald.
242 Florence.
242 Franklin, Warren Co.
201 Green Springs.
211 Graytown.
232 Houston.
242 Hughes Station.
233 Ludlow Grove.
170 Liberty, Guernsey Co.
* Cummingsville.....25 2 233 Cincinnati, O.
60 4 213 Chillicothe, O.
75 5 181 Manitta, O.
201 Port Clinton.
170 Port Washington.
181 Point Pleasant.
212 Potter.
233 Sharon.
202 Shawnee.
169 Unionville.
201 Venice.
159 Windham.
181 Whipple Run.

ONTARIO.

(All Other Line Offices.)

Appin.
Appleton.
Battersea.
Bracebridge.
Bellamy's.
Bradford Village.
Brewers Mills.
Cambray.
Carleton Place Village.
Chesterville.
Crosby Mills.
Elgin.
Enniskillen.
Everton.
Gorrie.
Gravenhurst.
Hampton.
Hawkstone.
Lime House.
Manilla.
Merriton.
Midland.
Milburne.
Nottawa.
Oakwood.
Parry Sound.
Point Farm.
Port Credit.
Portsmouth.
Rosseau.
Scotland.
Selby.
Severn Bridge.
Smith's Falls Town.
St. Williams.
Summerstown.
Thornhill Village.
Wendover.
Westport.
Zurich.

OREGON.

Cornelius.
Creswell.

PENNSYLVANIA.

59 Angora.
140 Antwerp City.
140 Catfish.
131 City Farm.
59 Darby.
151 Dixmont.
131 Elrod.
140 Fairview, Butler Co.
140 Fullerton, Clarion Co.
66 Grand Tunnel Colliery, ck. Wilkesbarre, Pa.
59 Glen Loch.
66 Girardville.
151 Hazelwood.
102 Howard, Centre Co.
59 Lincoln University.
150 Mooreheads
* Bangor.....35 2 52 Portland, Pa.
* Eldred.....55 4 120 Buffalo, N. Y.
25 2 120 Olean, N. Y.
* Kimbles.....20 2 46 Honesdale, Pa.
* Larabees.....25 2 120 Olean, N. Y.
55 4 120 Buffalo, N. Y.
* Port Allegheny.....60 4 120 Buffalo, N. Y.
25 2 120 Olean, N. Y.
* Wellsboro.....35 2 83 Corning, N. Y.
59 Moselm, P. O. A. Nora, Berks Co.
59 No. Wales.
66 Nottingham Colliery, ck. Plymouth, Pa.
130 Pioneer.
140 Petrolia City.
94 Richmond Furnace.
131 Riverton.
130 Russellburg.
59 Ridley Park.
159 Shenango, P. O. A. Shenango, Greenville, Pa.
150 Shaws.
130 Triumph.
94 Thompsontown.

QUEBEC.

(All Other Line Offices.)

Barnston.
Cap St. Ignace.
Carillon Wharf.
Desert.
Gatineau Mills.
Grenville Village.
Hunterstown Mills.
Lachine Locks.
Little Metis.
Longueuil.
Low.
Melbourne.
No. Wakefield.
Nouvelle.
Peche.
Riviere Ouelle.
Six Portages.
Soixante.
St. Romuald.
St. Henri.
Upper Wakefield.

RHODE ISLAND.

18 Bristol Ferry.
25 India Point, ck. Providence, R. I.

SOUTH CAROLINA.

146 Green Pond.
165 Grahamville.
175 Graniteville.

TEXAS.

511 Dallas.
511 Ennis.
511 Hutchens.
488 Lake.
490 Ledbetter.
500 Mexia.
480 Palestine.
486 Phelps.
484 Trinity.
486 Willis.

UTAH.

576 Camp Douglass.
* Farmington.....50 20 * 576 Salt Lake City, U.

VERMONT.

30 East Berkshire.
38 Enosburg Falls.
38 Highgate Springs.
35 W. Charlotte.

VIRGINIA.

118 Capon Springs.
142 Jordan Bridge Alum Springs.
95 Quantico.

W. VIRGINIA.

* Bowyers Ferry.....60 4 133 Greenbrier W. S. S., W. Va.
65 4 203 Huntington, "
* Hurricane.....65 4 133 Greenbrier W. S. S., "
40 3 203 Huntington, "
* Kanawha Falls.....65 4 133 Greenbrier W. S. S., "
60 4 203 Huntington, "

WISCONSIN.

Amounts given are Tariffs for Other Lines from Chicago.

316 Lyons.					
* Glenbeulah	50	3	* Pickets	60	4
* Lavalle	60	4	* Randon Lake	35	2
* New London	75	5	* Seymour	75	5
* Oakfield	50	3	* Waldo	35	2
* Orford	40	3	* Wauwatosa	35	2
* Princeton	60	4			

WYOMING.

570 South Pass.

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OBITUARY.

JOHN HORNER.

Mr. John Horner, Cashier of the New York Office of the Western Union Telegraph Company, died at the Gilsey House in this city, on Tuesday, September 10. This event, with the record of his life, deserves something more than a passing notice.

Mr. Horner had been suffering for many months from a painful disease, which entirely incapacitated him from the active duties of his position, but from which he was believed to be recovering, until about the middle of the past Summer, when he had a relapse. Pneumonia developed itself, which was the immediate cause of his death.

Mr. Horner was preeminently a self-made man. The success of his life was due to his inherent qualifications for the business in which he was engaged, together with his indomitable energy, and must serve as a bright lesson to those who are now filling positions similar to that in which he first embarked, a very young man, in 1846, in the very infancy of the telegraphic business.

In that year he entered the service as receiving clerk for the Magnetic Telegraph Company at Philadelphia, and remained there until 1850, when we find him in New York as Cashier and Receiver for the New York and Philadelphia, better known as the "House" line, which had its headquarters and only office at No. 21 Wall street. With this Company and its successors he remained until his death, every change bringing promotion to him, until, in 1866, upon the consolidation of all the existing Companies, he was appointed Cashier of the New York Office, a position in importance equalled by few in the telegraphic service.

Those who have had business at the General Office, No. 145 Broadway, will remember Mr. Horner's genial and pleasant face, as he was always at his post while in the enjoyment of health. He always had a pleasant word and smile for every one, and many a wrathful customer, who had charged upon him lion-like, retired as gentle as a lamb, soothed, if not satisfied. Those who are familiar with the tribulations of a telegraph receiver can best appreciate this talent and command of temper.

Mr. Horner was a shrewd business man, and those who did not well know him were apt to regard him as being a hard and difficult man to deal with. The writer, who was a very diminutive, tow-headed urchin in 1851, the only messenger employed by the "House" line, and who was under his immediate authority, knew him well, and knew of his many generous actions, to others as well as to himself. His generosity was limited only by his ability to gratify it.

He had his faults, as, indeed, who of us has not; but they were not glaring, and were more than atoned for by his many virtues.

Thus, one by one, those who have been identified with the telegraph from almost its inception in a practical form, are passing away. May he rest in peace.

In another part of the JOURNAL we present to our readers the preamble and rather lengthy constitution of an organization calling itself the "Telegraphers' Association." We give it the benefit of our circulation, out of pure kindness and to inculcate a lesson. In a future number we shall probably have something to say upon the subject. Meanwhile, digest it thoroughly.

We cannot inform our correspondent at Bedford, Iowa, where operators' badge or key pins can be procured.

WESTERN UNION TELEGRAPH COMPANY,
TREASURER'S OFFICE.
NEW YORK, September 16, 1872.

Executive Order, No. 141.

1. Messages to be transmitted at half rates will hereafter be received at any hour during the day until offices close for the night. Offices open all night will receive such messages until midnight.

2. The tolls on half-rate messages will in no case be less than twenty-five cents.

3. If a half-rate message has been received at the place of destination, and the party to whom the same is addressed calls at the office for it, the message may be delivered to him on his paying the difference between half rates and full rates on such message. No change will be made in the time of delivery of half-rate messages not thus specially applied for.

Anything in Order No. 94 in conflict with the above is hereby abrogated.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Sept. 9, 1872.

To Transfer Offices.

Section 7 of Instructions to Managers provides, that when the payee of a transfer order cannot be found within forty-eight hours, the Manager shall notify his local Transfer Agent of the fact, by telegraph, stating reasons, &c.

Managers are hereby instructed that after such notice to the Transfer Agent has been given, the order must be considered as cancelled, and no payment, in such case, can be made without a new order from the Transfer Agent.

G. H. MUMFORD, Vice-Pres't.

To Transfer Agents.

Referring to the above notice, and to Section 7 of Instructions to Transfer Agents:

If the payee of a transfer order does not call for the amount within forty-eight hours after proper efforts have been made to find him, the order should be cancelled and the receiving office directed to refund the same, retaining all tolls and premiums.

G. H. MUMFORD, Vice-Pres't.

STEARNS' DUPLEX INSTRUMENTS ON THE NEWFOUNDLAND LINES.

We learn from Mr. Henry H. Ward, Superintendent of the New York and Newfoundland Telegraph Company, who has just returned from a trip with Mr. Joseph B. Stearns, to introduce the duplex instruments on the lines of the company connecting with the Atlantic cables, that the instruments have proved a great success. The lines from Heart's Content to Plaister Cove, *via* Placentia, St. Pierre and Sydney, 554 miles in length—of which 332 miles are cable, in two sections, of 124 and 208 miles—work perfectly through the duplex, largely increasing the capacity of the lines for business.

Mr. Stearns is yet at Sydney, completing and perfecting the arrangements, but will return home in a few days.

The lines in Northern regions have heretofore been very much troubled and interrupted by aurora, which in those regions is much more frequent than in lower latitudes. During the experiments they found that, by disconnecting the wires from the earth and establishing a complete metallic circuit, all the effects of the auroral current were obviated, and the wires could be worked as perfectly as when there was no aurora visible. For lines in northern latitudes this is an important fact, and even where auroras are comparatively infrequent the demonstration will suggest a method by which the delays heretofore incident to auroral displays may be obviated.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
September 16, 1872.

To all Offices on W. U. Lines:

THE NEW TARIFF BOOK WILL GO INTO EFFECT OCTOBER FIRST, 1872.

Many of the offices have been directed by their superintendents that, with certain exceptions, the book might be used as soon as received. Such offices are hereby notified that the new book will be used on and after the above date, for rates, subject to the exceptions named hereafter in this order, to ALL points.

It is not intended that ANY *changes in present rates be made, except such as are given in* STATE RATES, RATES TO NEW SQUARES, 1 to 6 inclusive, 501 to 589 inclusive, AND RATES TO SQUARES 127 AND 128. If any increase in present rates to other points or squares is observed the present rate should be retained, and the increased rate reported to the Dist. Supt. The "LOCAL" and "SPECIAL RATES" *will remain unchanged.* The instructions in the book in regard to "local rates" are for new offices or for "local rates" not already determined. "Square rates" to all squares, except 109, 118, 127, 128, 149, 158, 168 and 190 (rates to 109, 118, 149, 158, 168 and 190 have been purposely omitted, there being no offices in these squares at present,) are the same as those given on tariff sheet now in use.

Lists of CHANGES IN NAMES AND RATES, ADDITIONAL NAMES, &c., will be found in the supplement of this number of the JOURNAL.

All CHANGES, &c., in the printed matter of the new book are given on the first half of the supplement. *These changes should be entered neatly and correctly* WITHIN TWENTY DAYS AFTER THE RECEIPT OF THE JOURNAL. The leaf upon which they are printed should then be folded, endorsed as follows:

(*Name of office,*)
(*Date of receipt,*)
(*Date of mailing,*)
(*Manager's name,*)

and mailed to your Western Union District Superintendent.

The ADDITIONAL NAMES of offices should be entered in the tariff book, but the page upon which they are printed should be preserved for future reference.

If the number of the square on your tariff sheet does not correspond to that before the name of the office in the alphabetical list in the book, report the fact immediately to your superintendent.

Managers are requested to report any inaccuracies or omissions they may observe in the new tariff book to the Tariff Bureau.

We are notified by the Cuba Cable Co. that their cable to Havana is still interrupted, and that on and after Sept. 18, 1872, an extra charge of three dollars, gold, should be added to the charge for each Cuba cable message to pay charges for dispatch boat between Key West and Havana.

WILLIAM ORTON, President.

Every office should exhibit a sign "Western Union Telegraph." The Supply Department is prepared to furnish the *Standard* sign—white letters on a blue ground. Fancy colors and shaded letters are prohibited.

NOTICE is hereby given, that Cyrus L. Negley, late a Foreman of Repairs in the Eighth District, E. D., is a defaulter, and has absconded. Any information that may be obtained relative to his whereabouts or his conduct should be communicated at once to D. H. Bates, Superintendent, Philadelphia.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY,

July, 1872.

APPOINTMENTS.

Operators.

J. F. Agne, 145 Broadway, New York City.
C. F. Bennett, 145 Broadway, "
Byrnes Edward, Cooper Union, "
J. H. Casey, 27th Street Depot, "
H. E. Crowell, Cotton Exchange, "
W. J. Cundall, " "
G. M. Eitermiller, 145 Broadway, "
Louise C. Ellsworth, " "
Mary E. Firder, Stevens House, "
F. G. Griffith, 145 Broadway, "
E. A. Keene, " "
H. Stanberry, " "
W. A. Sancton, Annapolis, N. S.
Mary Robbins, Barrington, N. S.
Alice A. Sponagle, Lunenburg, N. S.
A. T. Crulman, St. John, N. B.
William B. Waycott, St. John, N. B.
A. Melick, Sussex, N. B.
Edward P. Pillsbury, Bangor, Me.
Ella Clark, Bangor, Me.
Mary Flood, Burnham, Me.
F. S. Caldwell, Boar's Head, Me.
H. F. Dowst, Clinton, Me.
Ella C. White, Danforth, Me.
A. C. Preble, Farragut House, N. H.
D. Lowell Lamson, Fryeburg, Me.
E. F. Hatch, Gloucester, Mass.
George G. Watts, Hampton, N. H.
James H. Starin, Lewiston, Me.
C. McConnie, Mattawamkeag, Me.
J. H. Shaw, Old Orchard Beach, Me.
E. S. Merrill, Pigeon Cove, Mass.
Charles H. Sewall, Portland, Me.
William T. Kilmartin, Portland, Me.
William K. Starr, "
S. A. Batterson, "
Charles W. Davis, "
William Chambers, "
Annie M. Garvin, "
Ella A. Rhodes, Rockland, Me.
A. S. Mowry, Rye Beach, N. H.
Jennie C. Crocker, Sea View House, N. H.
Nellie P. Gould, Saco & Biddeford, Me.
John E. Simpson, So. New Market, Me.
Geo. F. Plaisted, York, Me.
D. W. Ramlet, Bethlehem, N. H.
H. P. Ross, Bath, N. H.
Geo. R. Penn, Concord, Mass.
Charles A. Sanborn, Tip-Top House, Mt. Washington, N. H.
E. P. Adams, Gorham, N. H.
Edward Savage, Lancaster, N. H.
C. J. Poole, No. Conway, N. H.
Miss O. L. Wood, Plymouth, N. H.
E. E. Eastman, Profile House, N. H.
J. A. Parker, Rutland, Vt.
W. P. Merrill, Waumbek House, N. H.
F. S. Stevens, White River Junction, Vt.
C. Brown, Deerfield, Mass.
H. Wilson, Shirley, Mass.
Miss N. C. Pope, W. Charlotte, Vt.
Miss J. L. Meek, Braintree, Mass.
Miss C. Wendell, E. Chatham, N. Y.
William Dwyer, Hartford, Conn.
G. W. Cowdrey, E. Canaan, Conn.
C. E. Bates, Hanson, Mass.
M. A. Sweet, Mattapoisett, Mass.
Geo. F. McPhilomey, Newport, R. I.
William Hynes, Rye, N. Y.
E. M. Arnold, So. Adams, Mass.
Miss E. F. KcKennon, So. Framingham, Mass.
Miss A. T. Potter, Southbridge, Mass.
W. M. Talcott, Westfield, Mass.
E. A. Beales, Watch Hill, R. I.
J. F. McHugh, Boston, Mass.
G. C. Pond, Boston, Mass.
Peter Morley, Albany, N. Y.
Albert Weeks, Brewsters, N. Y.
E. D. Stevens, Saratoga, N. Y.
E. A. Blaidslee, Saratoga, N. Y.
W. H. Johnson, Depot, Saratoga, N. Y.
Thomas Stewart, Union Hall, Saratoga, N. Y.
Fred. L. Rector, Congress Hall, Saratoga, N. Y.
Miss M. A. Costello, Williamston, Mass.
Geo. C. Smith, Norwood, N. J.
R. M. Gager, Auburn, N. Y.
F. D. Weaver, Greene, N. Y.
A. B. Morgan, Erie Depot, Rochester, N. Y.
J. H. Emerson, Rochester, N. Y.
H. Colleys, Suspension Bridge, N. Y.
John E. Bierhart, Salina office, Syracuse, N. Y.
E. W. Emery, Syracuse, N. Y.
W. J. Guilford, Utica, N. Y.
J. H. Arnott, Binghampton, N. Y.
A. Smith, Susquehanna, Pa.
J. W. Burdick, Waverly, N. Y.
Lawrence Wheeler, Cairo, Ill.
L. Vermilyea, Dubuque, Ia.
John McCloskey, Jacksonville, Ill.
S. E. Mills, Keokuk, Ia.
E. S. Swift, Chicago, Ill.
D. Kearny, "
W. D. Manners, Chicago, Ill.
E. G. Johnson, "
E. B. Ludlow, "
E. O. Waite, "
P. McKeever, "
D. McD. Hall, "
R. D. Williams, "
E. Lomasney, "
S. A. Buxton, "
A. H. Winter, Waterloo, Ia.
Allie Judkins, Brownsville, Neb.
Emily Quirk, Jefferson City, Mo.
Mrs. C. D. Barnum, Topeka, Ks.
M. J. Cornwall, Topeka, Ks.
Charles E. Brown, St. Louis, Mo.
Winfield S. French, "
Henry V. Warren, "
Henry S. E. Austin, "
Robert Marsh, "
C. W. Gearhart, Bitter Creek, Wyo. Ter.
John B. McCullogh, Cimarron, N. Mex.
Leroy H. Dayton, Fort Benton, Mon. Ter.
A. M. Bush, Golden City, Col.
E. C. Greene, Hughes, Col.
L. W. Bradley, Omaha, Neb.
J. W. Booth, Rawlins.
Charles E. Johnson, Antwerp City, Pa.
Louis J. Rock, Cresgon Springs, Pa.
L. L. Jeffords, Franklin, Pa.
W. S. Haymond, Fullerton, Pa.
W. H. Hotham, Reimerton, Pa.
Horace Brown, Sandy Creek, Pa.
J. E. Hadley, Tideonte, Pa.
J. B. Bryant, Pittsburgh, Pa.
L. B. McCarthy, Pittsburgh, Pa.
A. Kurtz, Cleveland, O.
B. F. Blair, Crestline, O.
Eugene Swereea, Port Huron, Mich.
B. F. Hendricks, Sandusky, O.
F. W. Baker, Denver, Ind.
John E. Ball, Indianapolis, Ind.
R. E. Bliss, Lafayette, Ind.
J. O. Moore, Logansport, Ind.
T. C. Fox, New Albany, Ind.
E. H. Johnson, Terre Haute, Ind.
Frank P. Kerer, Catlettsburg, Ky.
George Cummings, Cincinnati, O.
S. D. Weatherford, "
C. Tilghman, "
H. F. Lines, Sweet Chalybeate Springs, Va.
J. W. Alois, Yellow Sulphur Springs, Va.
H. R. Story, Augusta, Ga.
F. Dell, Beaufort, S. C.
M. L. Duvall, Goodman's, Fla.
W. B. Bowen, St. Marks, Fla.
Henry E. Hutchins, Barnett, Ga.
O. D. Parker, Blackshear, Ga.
H. J. Signilleat, Conyers, Ga.
A. Elliott, Grahamville, S. C.
A. B. Coburn, Green Pond, S. C.
Sam Christian, Pensacola Junction, Fla.
Frank Lee, Amite City, La.
B. P. Herndon, Terry, Miss.
Thomas Cooper, Kenaer, La.
G. A. Hazlewood, Jr., Auburn, Ky.
T. N. Duckworth, Stanton, Tenn.
A. C. Jones, Grand Junction, Tenn.
A. M. Brett, Scooba, Miss.
Geo. W. Culonhouse, Tupelo, Miss.
M. W. Riders, Waynesboro, Miss.
W. D. Manor, Saltille, Miss.
E. H. Mentz, Glasgow Junction, Ky.
Brown Hicks, Lexington, Ky.
E. D. Estes, Huntersville, Ark.
D. R. Sandford, Corsicana, Tex.
Louis Guzman, Carricitos, Tex.
G. W. Westervelt, Galveston, Tex.
A. H. Willis, Jewett, Tex.
J. A. Hagerland, San Marcos, Tex.
L. C. Palmer, Willis, Tex.
Albert Jaukes, Ledbetter, Tex.
D. R. Saunders, Palestine, Tex.
E. J. Smith, Hutchins, Tex.
E. L. Haviland, Ennis, Tex.
J. W. Ferris, Chef Menteur, La.
W. T. Stone, New Orleans, La.

RESIGNATIONS.

Operators.

Ella Aldrich, 145 Broadway, N. Y. City.
L. Bradley, " "
C. C. Carpenter, " "
N. W. Gove, " "
H. S. Griggs, New York Hotel, "
Kate Hickey, Worth and B'dway, "
F. A. Wales, 145 Broadway, "
C. A. Weiss, " "
L. E. Weller, Board of Brokers, "
Eliza A. Hunter, Glen Cove, L. I.
D. S. Lyons, 5th Ave. Hotel, N. Y. City.
H. J. Brown, Brooklyn, L. I.
E. Gordon, 145 Broadway, N. Y. City.
O. Jenks, 145 Broadway, N. Y. City.
Nellie S. Sponagle, Barrington, N. S.
A. L. Rudolf, Lunenburg, N. S.
C. L. Martin, Sussex, N. B.
Edward O. Chase, Bangor, Me.

ANNUAL MEETING OF THE GOLD AND STOCK TELEGRAPH COMPANY.

The annual meeting of the Gold and Stock Telegraph Company was held at the office of the Company, No. 61 Broadway, in this city, on Tuesday last, September 10, and the following gentlemen were elected Directors for the ensuing year: Tracy R. Edson, William Orton, Horace F. Clark, Joseph M. Cook, Marshall Lefferts, James H. Banker, Alonzo B. Cornell. At a subsequent meeting of the Directors, Marshall Lefferts was elected President; Joseph M. Cook, Vice-President, and Norman C. Miller, Secretary and Treasurer.

TELEGRAPHERS' INSURANCE ASSOCIATION.

The acknowledgement of receipt on any one assessment is to be understood as an acknowledgment of all previous assessments.

Assessment No. 31.

65	70	93	97	100	120	144	154	156	158	160
164	166	172	178	206	215	230	233	237	289	357
359	362	364	366	382	414	422	456	524	570	584
605	648	652	661	667	692	708	723	724	728	743
744	773	789	790	815	824	896	897	918	929	930
941	954	955	956	957	958	959	960	963	964	976
979	1024	1040	1042	1048	1072	1080	1170	1181	1191	1207
1226	1227	1234	1235	1265	1268	1569	1270	1295	1324	1361
1369	1406	1415	1416	1457	1458	1508	1509	1512	1573	

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 21. NEW YORK, OCTOBER 1, 1872. WHOLE NO. 118.

WHEATSTONE'S RHEOSTAT.

The rheostat invented by Mr. Wheatstone, is an instrument, by the aid of which, resistonces from the smallest to the largest, can be accurately measured.

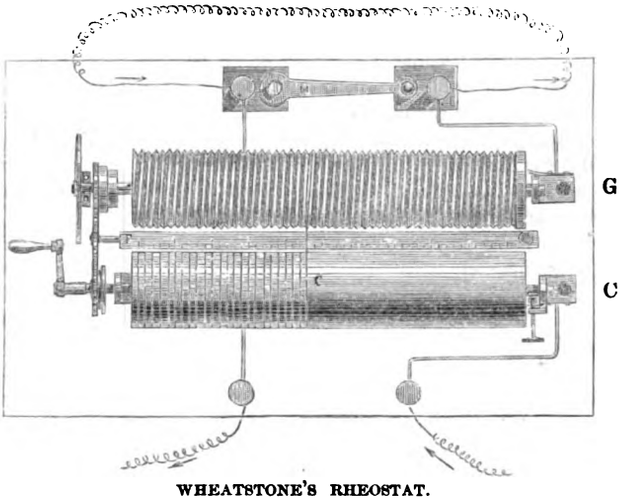
This apparatus is composed of two cylinders, G C, the one metallic, the other wooden, or hardened caoutchouc, and of exactly the same diameter, and whereon a very fine German silver wire can be rolled and unrolled alternately; the latter's resistance being previously known. In order that the turns of the wire when rolled upon the wooden cylinder G may be well separated from each other, the cylinder is channeled in its full length by a fine helicoidal furrow, like a screw. An indicator placed at the extremity of the instrument at the end of these cylinders, or a graduated ruler, E F, enables us to count not only the number of turns of wire made by the cylinders, but even the fractions of turns. Finally, the apparatus is so constructed, that when we turn one of the cylinders, the other turns at the same time, so as to let the wire unroll on one side, as fast as it rolls up on the other. In order that the rheostat may be in good condition, the wire ought to be kept stretched out all the time, between the cylinders.

As a complement for this instrument, there is required:—firstly, a set of resistance-coils, gauged at the same unit as the wire of the rheostat; secondly, a sine or differential galvanometer. With these accessories the use of this apparatus is easy to understand.

Suppose, for example, we wish to ascertain by means of the differential galvanometer, the resistance of a piece of wire: the two extremities of this wire should be connected with the two poles of a battery, interposing on the thus formed circuit one of the wires of the differential galvanometer; from the same poles of the battery another circuit should be made, in which the wire of the rheostat, and the second wire of the differential galvanometer are interposed. Care must be taken to arrange the connections in such a way, that the two currents shall pass through the galvanometer in opposite directions.

When the rheostat is turned, so that all the German silver wire is rolled up on the copper cylinder, it offers no appreciable resistance, and the needle of the galvanometer will strongly deviate under the influence of the current which crosses the cylinder, because the second current is weakened by its passing across the resistance of the wire which is to be measured; but if the German silver wire is successively rolled up on the wooden cylinder, the first current is obliged to follow this wire in its different revolutions around the isolating cylinder, and there is a moment when the resistances of both circuits are precisely equal, one being weakened just as much as the other. Now, this moment is indicated when the needle of the galvanometer returns to zero. Then we stop the rheostat and read from the index the number of turns, and fractions of turns marked there, which indicate the unknown resistance.

The wire of the rheostats usually contain a resistance of about ten miles of No. 8 iron wire, or one hundred and fifty ohms, but when the resistances to be measured are greater than this, additional gauged coils are interposed into the circuit of the rheostat, and then the rheostat serves to make up the differences.



WHEATSTONE'S RHEOSTAT.

This method of measuring resistances is called "the differential method," but there is another to which the name of "method by substitution," is given, which has equal advantages, and which requires nothing but a simple sine or tangent galvanometer.

In using the latter method, the galvanometer is interposed in the circuit for measuring, and the deviation of the needle is noted down; we then substitute in place of this circuit, that of the rheostat; the resistance whereof is increased, until the deviation of the galvanometer coincides with the first reading.

This increase of resistance exactly indicates the resistance of the circuit measured. The inconvenience of this method is, that the variations in the strength of the battery may affect the indications upon the galvanometer.

In the perfected rheostats the wire pushes forth just before being unrolled, a currier's knife, which stops the cylinders the moment that the wire arrives at its starting point. By this means, the breaking of the wire is avoided. In order to secure a good connection between the rheostat wire and the outside circuit, the axles of the cylinders, to which both extremities of this wire are soldered, are provided with iron disks, which dip into little troughs, filled with mercury. In this way the connection is maintained through the mercury.

ELECTRO MAGNETS.

The electro-magnet performs so important a part in all systems of electric telegraphy that we deem it necessary to devote some space to the exposition of their properties and to the examination of the conditions of the developement of their magnetic power.

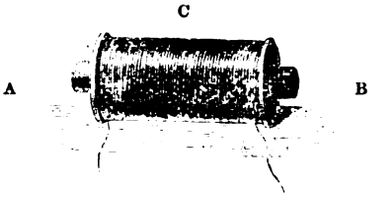


FIG. 1.

In the accompanying illustration (Figure 1) C is a bobbin, around which is rolled a long copper wire covered with silk, into the interior cavity of which is placed a bar of soft iron, A B. At the moment that an electric current is transmitted over the wire of bobbin C, the bar A B becomes a magnet, remains magnetic as long as the current continues to pass, and relapses into the neutral state the moment that the current is interrupted. Moreover, according to the theory of Ampere, the south pole of the magnetic bar is always at the left of the current, which traverses the wire of the bobbin.

The most common experience shows that the magnetism which is developed in the bar increases with the strength of the current. It is evident, besides, that, the strength of the current remaining the same, the magnetic power of the current is proportional to the number of convolutions of the conducting wire, provided the diameter of the bobbin be within such limits that the action of the current remains comparatively independent of the distance of the wire from the soft iron bar.

As the result of experimental research, Messrs. Lenz and Jacobi deduced the law that the magnetic force developed in a soft iron bar is proportional to the product of the strength of the current by the number of turns of wire which surrounds the core.

Mr. Muller has demonstrated, that this law is correct, as long as the operation is conducted with feeble currents on cylindrical bars, the diameter of which are not very small in proportion to their length. He has established besides, that between the limits within which the law of Messrs. Lenz and Jacobi stand good, the magnetic forces developed in the soft iron bars are proportional to the square roots of their diameters.

By indicating by m the developed magnetic intensity, by I the quantity of the current, by n the number of convolutions of the wire, by d the diameter of

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the soft iron bar, and by c a constant quantity, we have consequently

$$m \quad cnI\sqrt{a}$$

But the experiments of Mr. Muller prove at the same time, that the proposition of Messrs. Lenz and Jacobi cannot be accepted as a general law. It appears, in fact, from his experiments, that for each soft iron bar, there is a *maximum* of magnetic intensity, which cannot be exceeded. This maximum is proportional to the diameter of the bar.

The electro-magnets, however, used in all systems of electric telegraphy are always operated under such conditions, that the law of Messrs. Lenz and Jacobi are applicable to them, and the magnetic intensity of the iron bar without any appreciable error can be reprepresented by the preceding formulæ.

While, on the one hand, the multiplication of the number of convolutions of wire on the bobbin increases the action of the current on the soft iron bar, on the other hand it diminishes the quantity of the current passing through the wire by making a considerable increase in the resistance of the circuit. Consequently there is a certain arrangement of the wire of the bobbin, which cannot be deviated from, that with a given battery, and acting in determined conditions, will communicate to a soft iron bar the *maximum* of magnetic intensity.

Between the limits in which the law of Messrs. Lenz and Jacobi is applicable, experience and the considerations deduced from the laws on voltaic currents agree in establishing the following rule:

When the resistance of the wire on the bobbin is equal to the resistance of the exterior circuit of the electro-magnet, including that of the battery, the *maximum* of magnetic intensity is obtained.

The electro-magnets, used in electric telegraphy, are made in the form of a horseshoe.

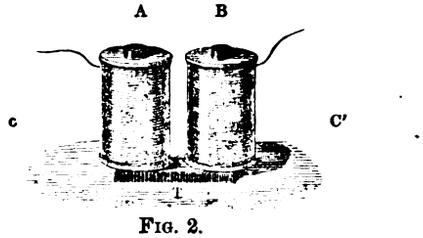


FIG. 2.

C C', figure 2, are the two bobbins, A B the two soft iron bars; T is a breech of soft iron, which connects the two bars. These electro-magnets are of two kinds, called relay magnets and register magnets, or sounder magnets.

The first are placed in the circuit of the main line, which extends between the two corresponding stations. In this case the resistance of the exterior circuit is always very large.

In order that the resistance of the relay may be equal to that of the remainder of the circuit, without its mass occupying too much space, the bobbins of these electro-magnets must be made of very fine wire, forming a very large number of convolutions around the bars. As the distance over which telegraphic circuits are worked vary according to circumstances, it is practically impossible that the electro-magnet placed in the circuit of the line can absolutely attain in every case the conditions of *maximum* intensity deduced from the law of Messrs. Lenz and Jacobi. Upon the lines in this country the resistance of the relays generally run from 125 to 150 ohms, although some are in use containing three or four times as much. In France the main line magnets generally have a resistance of about 2,000 ohms, the wire which is used being fine enough to contain about 2,000 turns, without making the magnets inconveniently large.

The electro-magnets of the second class are operated by the local batteries of the stations in which they are placed. In this case the exterior circuit is very short, and its resistance reduced nearly to that of the battery itself. The wire of the bobbins of these electro-magnets are rather large, and the number of the turns is not very considerable.

We said in commencing this article that at the moment when the current was interrupted, the soft iron bar within the bobbin immediately loses its magnetism and returns to its neutral state. This is not absolutely true. The bars of the electro-magnets always retain, after the discontinuance of the current, a feeble magnetic power, of which the intensity and duration can be considerably diminished, but which it is impossible to completely prevent. The qualities of the iron have much to do with this matter. The better it is wrought, and the softer the iron, the less permanent magnetism will it retain, and the more rapidly does the complete demagnetization take place. Experience shows, besides, that the immediate contact of the iron armature with the poles of the electro-magnet power fully contributes to increase the intensity and the duration of the permanent magnetism; a slight sheet of paper put between the poles of the magnet and the armature is sufficient to hasten considerably the demagnetization of the soft iron bars.

In the construction of relay-magnets and sounders, too much care cannot be taken to diminish the effect of permanent magnetism. This is the only means to obtain electro-magnets, which can produce very rapid oscillations upon their armatures, and thus communicate signals rapidly.

The rapidity of telegraphic correspondence depends, in a great measure, upon the speed with which the soft iron bars become magnetized and demagnetized under the influence of the alternate passage and interruption of the inducing currents.

Consequently, iron as soft as possible must be selected for constructing the bars of electro-magnets, and care must be taken to regulate the play of the movable armatures, in such a manner that they can never come in direct contact with the poles of the electro-magnet.

INDUCED CURRENTS.

In 1832, Prof. Faraday discovered that an electric current or a magnet is able by induction to develope at a distance electric currents in a conducting wire, just as a body charged with static electricity electrizes an insulated conductor by induction. The following is the mode by which this remarkable result is obtained:

We wind round a wooden cylinder two silk-covered wires, so as to make two perfectly similar helices, the spirals of which are parallel, and as near to each other as possible. The two ends of one of the wires are made to communicate with a galvanometer, and the two ends of the other with the two poles of a battery. At the moment when this latter communication is established, the first having been established previously, the needle of the galvanometer is seen to deviate; but this deviation immediately ceases, even though the current of the battery continues to circulate. As soon as this current is interrupted, the needle of the galvanometer a second time experiences a sudden and more permanent deviation; but this deviation occurs in a contrary direction to that in which the former had occurred. Thus the voltaic current that traverses one of the wires determines in the other an instantaneous current at the moment when it commences to pass, and determines it in a second at the moment when it ceases to pass. These two currents are called *induced currents*, and the current of the battery the *inducing current;* the induced currents, as we see, are instantaneous. Let us further add that the former has a direction contrary to that of the inducing current, and the latter a similar direction.

This experiment proves that when we suddenly bring near to a part of a conductor, forming a closed circuit, a conductor traversed by a current, we determine in the former an instantaneous current, moving in a direction contrary to that of the current brought near to it; and that when we remove it, we determine a second instantaneous current, moving in the same direction with the current that is removed.

The intensity of the induced current depends on many circumstances; first, on the length and diameter of the wires of the helices; and then on the energy of the inducing current, or the strength of the magnet. In general, it is advantageous to take very long wires, and even to add several helices end to end, one after the other; but if we are not producing the induction with a magnet, it is necessary to employ an inducing current arising from a battery of a great many pairs.

GAS LIGHTING BY ELECTRICITY.

A new patent apparatus for the instantaneous lighting or extinguishing of gas lamps has just been successfully tried at Preston, England, and is thus described in the *Engineer:* "The apparatus constituting the invention looks like a moderate sized globular inkstand of glass, surmounted by a tube of the same material, with a metallic top; and, by screwing off the burner, it can be very easily attached to any lamp, chandelier, pipe, or ordinary gas jet. The base or globular portion is filled with a deep red colored liquid—a simple chemical mixture, with no combustible properties, almost without smell, and so cheap that three pennyworth of it will serve one lamp for twelve months, Over this liquid, and within the glass tube, there is a plate of zinc, along with a piece of graphite or gas coal, and, between those and a thin coiled platinum wire fixed over the cap of the general vessel into which a gas burner is inserted, galvanic communication is obtained. A pipe, to be screwed to that up which the ordinary gas supply flows, runs through the base of the vessel to about the centre of the surmounting tube; pressure brought to bear upon the gas in this pipe causes, by small collateral openings, a simultaneous depression upon the chemical solution which occupies a lower level in two side tubes; the gas occupies the vacuum caused by the displaced liquid, and then ascends to a chamber in connection with the burner, while the displaced liquid is pressed into two side tubes effecting contact with the zinc and graphite, generating galvanic electricity, which is communicated to the platinum wire, and excites the catalytic power of the wire, which, when exposed to the ascending jet of gas, results in immediate, almost instantaneous, ignition. Each lamp requires one of these appliances, but, as stated, they are cheap, and the price of the requisite liquid may be termed nominal. The apparatus is virtually self-acting; it requires no skilled hands to superintend its operations; it may be attached by a novice; it may be replenished at any ordinary chemist's shop for a few pence per year; it needs nothing but fixing, and then being subjected to the simple action of gas pressure."

The idea of attaching a separate galvanic battery to each gas burner, for the purpose of igniting and extinguishing the gas, may be novel, but certainly it is complicated.

The method now extensively in use in this country is much better, and is as follows:

A galvanic battery is placed in the cellar, attic, or other convenient portion of the building, from which

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wires extend to the gas meter, and also to each gas burner over the orifice of every one of which a fine platinum wire is arranged in such a manner as to form a part of the electric circuit.

In connection with the battery and wires two or more telegraph keys or buttons are employed, placed wherever convenience requires. By touching one of the keys the electric current is made to operate a magnet and lever which is attached to the gas cock, whereby the latter is turned and the gas either let on or shut off. By touching the other key the electrical current is made to pass through the several platinum wires on the burners, thereby almost instantly heating the platinum up to a nearly white heat and igniting the gas. It is a pretty sight to witness the sudden ignition of the jets of a large chandelier in this way.

This plan of lighting, first practically applied by Professor Samuel Gardner, is employed for lighting the great dome and other apartments of the Capitol at Washington. Stewart's store and dwelling, and Booth's Theatre, New York, and, in fact, hundreds of buildings, public and private, in various parts of the country, are electrically lighted in this manner, and the success of the system will now make its employment general.

BREVITY IN DESPATCHES.

The despatches which pass over a telegraph line in the course of a year, if collected together, would present a very curious and interesting volume of correspondence. The price of the transmission of a message depending upon the number of words which it contains, of course renders the construction of it necessarily as brief as possible. Most despatches are contained in less than ten words, (exclusive of address and signature, which are not charged for,) and it is surprising how much matter is often contained in this brief number. Among the best examples of brevity which we have met with, however, are the two following.

A lady in a neighboring city, desirous of ascertaining when her husband would return home, sent him a message making the inquiry; to which he responded, that important business detained him, and that he could not leave for some days.

The lady immediately replied by sending him another despatch in the following laconic manner:—

"To F. C. P.—Despatch received. Deuteronomy xxiv, 5. (Signed,) "KATE."

The gentleman to whom the despatch was addressed, upon referring to the passage in the Scriptures alluded to, obtained the following lengthy and suggestive epistle :—

"When a man hath taken a new wife, he shall not go out to war, *neither shall he be charged with any business:* but he shall be free at home one year, *and shall cheer up his wife which he hath taken.*"

The second example is the reply sent to a person in a distant city, who, having committed some offence against the laws, and run away, was desirous of ascertaining if it would be prudent for him to return. He therefore telegraphed in the following laconic style :—

"NEW YORK, July 4.

"To B. C. M.——, Philadelphia.
"Is everything O K ? "D. T. M."

To which he obtained the following reply:—

"PHILADELPHIA, July 4.

"To D. T. M——, New York:—Proverbs, chap. xxvii., 12.

Upon reference to the passage indicated, the inquiring individual obtained the following advice, which, it is to be presumed, he followed:—

"A prudent man foreseeth the evil, and *hideth himself;* but the simple pass on, and are punished!"

COMPARATIVE STATEMENT OF THE TELEGRAPHIC SYSTEM IN NORWAY FOR 1870 AND 1871.

I.—LINES.

	1870.	1871.
Length of lines in miles	3,833	3,935
Length of wire in miles	5,610	5,852

II.—OFFICES.

Number of Offices.	Open for home and international service.	142	147
	" " home service only	0	0
	Total	142	147
Number of Offices.	Government offices	95	93
	Of railroad or private companies	46	53
	Semaphorical, with telegraphic service	1	1
	Total	142	147
Number of Offices.	With permanent service	1	1
	" full day service	98	98
	" limited "	43	48
		142	147
Number of depot offices		0	0

III.—APPARATUSES.

Number of apparatuses in service.	Morse's system	173	171
	Other systems	* 58	* 66
		231	237

IV.—PERSONNEL.

Upper employees, and of the central administration.	22	22
Number of office employees	312	324
Subaltern personnel	200	192
	534	538

V.—MESSAGES.

Interior Service.—Messages sent		285,632	300,365
International Service.	No. of messages sent abroad	78,377	78,595
	" " received from abroad	89,549	91,982
	No. of messages passing in transit from one frontier to the other	18,332	22,247
	Total	186,258	192,824
No. of service messages		21,455	25,533
Total of number of messages		493,345	518,722

VI.—RECEIPTS.

Product of home correspondence	$93,959	$99,603
Product of international correspondence	67,607	69,377
Sundry receipts—correspondence	1,341	2,067
	$162,907	$171,047

VII.—EXPENSES.

Extraordinary Budget.—Construction		$87,154	$15,723
Ordinary Budget	Personnel	92,950	99,405
	Expenses of operation and repairs of the lines and offices	46,636	61,484
		$226,740	$176,612

GENERAL INFORMATION.

Population of the State, according to census	1,807,500	1,813,000
Surface of the State in square miles	195,641	195,641

* Wheatstone's double needle apparatus, 27 ; Siemen's dial apparatus, 13 ; Wheatstone's electro-magneto, 2 ; Wheatstone's single needle apparatus, 16.

COMPARATIVE STATEMENT OF THE TELEGRAPHIC SYSTEM OF SWEDEN FOR 1870 AND 1871.

I.—LINES.

	1870.	1871.	
Length of lines in miles	4,050	4,208	268 miles of line belong exclusively to the railway or to private companies.
Length of wire in miles	10,105	10,310	2,096 miles of wire belong as above.

II.—OFFICES.

Number of Offices.	Open for home and international service	173	178	The greater part of the railway wires are suspended to the posts belonging to the Telegraph administration.
	Open for home service only	113	120	
	Total	286	298	
Number of Offices.	Government offices	99	103	
	Of railroad or private companies	187	195	
	Semaphorical, with telegraphic service	....	....	
	Total	286	298	
Number of Offices.	With permanent service	4	4	
	" full day service	47	47	
	" limited service	235	247	
	Total	286	298	
Number of depot offices		2	3	

III.—APPARATUSES.

No. of apparatuses in service.	Morse's system	385	409	Dial apparatuses.
	Other systems.	164	182	
		549	591	

IV.—PERSONNEL.

Upper employees, and of the central administration	20	20	In general, no special employees are engaged for the telegraphic service on the railroads.
Number of office employees	322	325	
Subaltern personnel	188	197	
	530	542	

V.—MESSAGES.

Interior Service.	Paid messages sent	407,589	469,183	Those messages concern meteorological observations.
	Free messages sent	9,539	9,792	
	Total	417,128	478,975	
International Service.	No. of messages sent abroad	86,592	94,086	
	No. of messages received from abroad	90,753	96,767	
	No. of messages passing in transit from one frontier to the other	47,050	45,800	
	Total	234,395	236,653	
Total number of messages			715,628	

VI.—RECEIPTS.

Product of home correspondence	$130,360	$141,987	Including the appropriation for building new lines.
Product of international correspondence	93,840	101,430	
Sundry receipts	27,400	69,776	
Total	$251,600	$313,193	

VII.—EXPENSES.

Extraordinary Budget.—Construction of new lines	$24,940	$66,406	
Ordinary Budget. Personnel	143,460	143,725	
Ordinary Budget. Expenses of operation and repairs of the lines and offices	58,080	60,786	
Total	$226,480	$270,917	

GENERAL INFORMATION.

Population of the State, according to census		4,204,177	
Surface of the State in square miles	270,934	270,934	Continents & islands, 247,919. Lakes and streams, 26,482.

NOTE.—Sweden jointly operates certain offices in connection with neighboring countries, as for example :

With Denmark, at Copenhagen, where two Swedish employees are stationed.

With Germany, at Malmo, in Sweden, where nine German employees are stationed.

With Russia, at Haparanda, in Sweden, where one Russian employee is stationed.

With Russia and the Grand Northern Telegraph Company, at Nystad, in Finland, where one Swedish employee is stationed.

Sweden owns, jointly with Prussia, the trans-Atlantic cable laid down in 1865 between Skare, in Sweden, and Arcona, at the Island of Rugen. The length of this cable is forty-five miles.

Also the cable laid in 1862 in the Sound, between Huesborg, in Sweden, and Vedbek, in Denmark, belong in common to those two kingdoms. The length of the cable is 9.5 miles.

In October, 1872, a joint Swedish-Norwegian office will be established at Christiania, the capital of Norway, where two Swedish employees are to be placed.

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VARIOUS UNITS OF ELECTRICAL RESISTANCE.

Wheatstone's Unit.—To Prof. Sir Charles Wheatstone is due the credit of having constructed (in 1840) the first instruments by which definite multiples of a resistance unit could at will be added to, or subtracted from, a given circuit. The standard resistance unit which he proposed and employed, was that of 1 foot of copper wire, weighing 100 grains.

Jacobi's Units.—Professor Jacobi of St. Petersburg has made various suggestions for units of electrical resistance. The unit which is commonly known as Jacobi's Unit, and of which he sent copies to various physicists; was made of a length of 25 feet of a certain copper wire, weighing 345 grains.

Another proposition of Professor Jacobi was to employ as unit of electrical resistance that of a copper wire 1 metre long and 1 millimetre diameter.

Siemens' Mercury Unit.—This unit represents, according to the definition of Dr. Werner Siemens, the resistance of a prism of pure mercury 1 metre long and 1 square millimetre section at 0° C.

This Unit was first produced in 1860, and resistance coils in German silver wire were adjusted from it. A reproduction of the normal resistance tubes, in 1863, was found to agree within 0·1 per cent. with the results originally obtained. An error, arising from the specific gravity of mercury having been taken as 13·557 instead of 13·596, was corrected in 1866, so that all Siemens' resistance coils issued previously to that date are 0·29 per cent. too great. That is to say, the resistances which are marked as 1, are really 1·0029 mercury units, and the end results have to be multiplied by this constant (1·0029) in order to be expressed in mercury units according to the definition. One Siemens' Unit = 0·9536 ohms.

French and Swiss Units.—In the Telegraph Administrations of France and Switzerland, the unit of the electrical resistance coils in use for some time previous to 1867, was equivalent to the resistance of a length of one kilometre of the iron wire employed for the telegraph lines, 4 millimetres diameter. As no very exact measurements are required to be made of overhead lines, these units were not either defined or produced very exactly, and no temperature was given to enable a reproduction of the units if it should have been deemed desirable. Consequently, the unit coils of the Swiss ateliers, and those of Bréguet and Digney, differed amongst themselves as much as 15 per cent. In 1867 both Bréguet and Digney readjusted their units to one-tenth of a mercury unit, which is very nearly their original value. In all French submarine cable work, resistance-coils adjusted to the mercury unit are employed.

Matthiesen's Unit.—This unit was defined as the esistance of a statute mile of pure annealed copper wire one-sixteenth of an inch diameter, at 15·5° C.

Varley's Unit.—This unit obtained considerable employment in cable and line work of the E. and I. Telegraph Company. Mr. Varley originally constructed it from a statute mile of special copper wire one-sixteenth of an inch diameter; but afterwards readjusted it to twenty-five mercury units.

German-mile Unit.—The first unit of measurement used in the telegraph service in Berlin was that of a German mile (8,238 yards) of copper wire, its diameter being one-twelfth of an inch, and its temperature 20° Cent. Resistances adjusted to this unit were manufactured, as early as 1848, by Messrs. Siemens & Co., but have been long since superseded in Prussia by coils adjusted to the mercury unit.

THEORETICAL HYPOTHESES.

Two great hypotheses have been proposed for explaining electric phenomena. One of them, proposed by Franklin, and adopted by Cavendish, Cavallo, Beccaria, Æpinus, Volta, and others, is still employed by some philosophers; the other, proposed by Symmer, and adopted by Coulomb, Poisson, &c., is more generally employed by writers on electricity at the present time.

Franklin admitted the existence *of a solitary electric fluid*, acting by repulsion on itself, and by attraction on all ponderable substances. According to this hypothesis, this fluid is spread over all substances in nature; and in order that electric equilibrium should exist between any body and the bodies which surround it, each of them must contain a certain quantity of electricity, depending upon its mass and nature. The friction and other means of electrization act, by increasing or decreasing the quantity of electricity which the bodies contain. A substance is positively or negatively electrified, according as it contains a quantity of electricity superior or inferior to that which corresponds to this neutral state or equilibrium. Notwithstanding its seeming simplicity, this hypothesis of Franklin does not adapt itself very easily to the explication of the attractions and repulsions remarked between electrified bodies.

In Symmer's hypothesis the existence of two electric fluids is admitted. One of them is developed upon polished glass, when rubbed with wool, which is called the *vitreous or positive fluid;* the other is developed upon a stick of rosin, when rubbed with wool, which is called the *resinous or negative fluid.* Each of these imponderable fluids is formed by molecules, which repel each other, while the molecules of one attract the molecules of the other. In conducting bodies these fluids move freely, and their molecules, obedient to their mutual repulsion, accumulate upon the surface, where they are retained by the resistance which the air, in its quality of an isolating body, opposes to their displacement. The molecules of non-conducting bodies do not allow of the displacement of the electric fluids which remain located in the parts where they have been developed. Two equal quantities of positive fluid and negative fluid, brought face to face, are obedient to their mutual attraction—combine together and reconstruct the neutral or natural fluid. This neutral fluid exists normally in every body in nature, but its presence is not manifested by any exterior phenomenon, on account of the opposite properties of its two constituent elements.

The action of friction, and of other means of electrification, are confined to a decomposition of *neutral* fluid; one of the bodies becoming charged with *positive* electricity, the other with *negative* electricityt and the elementary fluids, thus liberated, manifes, their presence by the usual phenomena of attraction and repulsion.

The ideas of Symmer on the composition of neutral fluid, and on the *modus operandi* of the various processes of electrification, agree with the results supplied by the two following experiments:

1st. If two bodies are rubbed against each other, as long as the contact lasts, it is impossible to ascertain any sensible sign of electric reaction; but the moment that the two bodies are separated they are both electrified, one of them negatively, the other positively.

2d. Two balls of elder pith, isolated and charged with the same quantity of opposite fluids, attract each other; but the moment they touch no trace whatsoever of electrification is preserved, and they resume the natural state.

In the actual condition of science many objections arise against Symmer's hypothesis, but the theory of the two fluids has the great advantage of being easily adapted to the exposition and classification of observed facts. It seems to us that it ought to be preserved not as an admitted fact, but as a conventional term. In fact, experience shows that, under the influence of friction, chemical action, heat, &c., the surface of contact of the two bodies present becomes the seat of a special power, which develops in these bodies two *opposite forces*, but nothing positive has been taught as to the *nature* of these forces. The expressions, *positive fluid and negative fluid*, consequently, ought to be accepted only as a means to denominate these forces, and at the same time to indicate that their actions are opposite to each other.

COMPARATIVE TEST OF INSULATORS.

NEW YORK, Sept. 26, 1872—10 A. M.

Fine rain falling during past hour. Heavy rains during the night.

Ten insulators of each kind ("Pond" and W. U. Glass) attached to standard, and exposed to weather one week.

	65 Cups Z. Deflection of Needle.	85 Cups P. Deflection of Needle
Pond	½ degree.	¾ degree.
W. U. Glass	8½ "	11 "

NEW THEORY OF TERRESTRIAL MAGNETISM.—Professor Zollner proposes a new theory in regard to the origin of terrestrial magnetism. He adopts the idea of drift currents upon the liquid surface of the sun, by means of which he tries to explain the movement of the sun spots. These drift currents originate, according to his conception, from the current of heat continually ascending from the interior, and from the rotation of the sun. Such currents, Professor Zollner maintains, exists in all rotating cosmical bodies, even after the surface, cooled by radiation, has become rigid to a certain extent. This is the case with the earth, and the continuous regular currents of the interior liquid mass produce different effects upon the outer shell, mechanical, thermal, and also magnetical, the latter as a necessary consequence of the electricity originated by the currents. The professor further maintains that by this hypothesis the general phenomena of terrestrial magnetism may be satisfactorily explained, and that they are related to the currents of the inner liquid mass, and whatever effects these currents, as, for instance, volcanoes, reacts immediately upon the magnetism of the earth. Whenever a cosmical body becomes entirely solid, no induced magnetism can exist, etc — *Harper's Magazine for September.*

MISS CAROLINE SMITH has favored the world with a rhymed *expose* of the deep-laid plans of our telegraphic companies. As to the future, she darkly suggests:

> And is not this their object your rights to tear down,
> And control a free suffrage through country and town,
> And to secretly gain such political power
> As may serve their dark purpose at some future hour?

The evils of the present consist in the well-known noises produced, according to the authoress, by the dispatches passing over the wire:

> The sick and the helpless are doomed now to hear
> The incessant loud ring from the posts far and near,
> And unless they 're removed in due time from the noise,
> It endangers their life or their reason destroys.

Miss Smith wishes the press to demand the destruction of all telegraph lines, and especially of those which pass through her town. As she has cunningly concealed the name and location of the town, we cannot comply with the latter part of her request

Emerson says that every man or woman who is intellectually well is a poet.

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FOREIGN TELEGRAPHIC ITEMS

The directors of the India Rubber, Gutta Percha and Telegraph Works Company have announced an *ad interim* dividend at the rate of five per cent.

The receipts of the Great Northern Telegraph Company's European lines amounted for the month of August to 131,606fr. (£5,264), and for August, 1871, to 106,612fr. (£4,264), showing an increase of £1,000. The traffic receipts on the China and Japan lines for the month of July amounted to 97,485fr. (£3,899), against 61,245fr. (£2,450) in July, 1871, showing an increase of 36,240fr. (£1,449). In consequence of interruptions on the Siberian land lines the traffic returns for the month of August had not yet arrived from China and Japan.

Advices from Buenos Ayres announces the inauguration, on the 29th of July, of the Transandine Telegraph, connecting the River Plate with the Pacific, the works of which were commenced in November, 1870. Senor Sarmiento, the President of the Argentine Republic, declared a national holiday on the occasion, and the ceremony was attended by the foreign ministers and consuls and all the principal persons in Buenos Ayres, including Mr. Wheelwright, who was the first introducer of the telegraph system into Chili. As the Brazilian line with Montevideo is nearly finished, Valparaiso and Buenos Ayres will soon be within fourteen days' communication with Europe, and next year, when the cable shall have been laid between Brazil and Europe, the chain through South America will be complete and instantaneous.

The total number of messages forwarded from postal telegraph stations in the United Kingdom, during the week ending August 31, 1872, was 320,920, an increase over the corresponding week of last year of 64,811.

The *South Australian Register* states that by the middle of June the Superintendent of Telegraphs calculates that not less than 150 miles would remain unconstructed. A despach has been received from Tennant's Creek, announcing the arrival of Mr. Lewis and party with their horses, on the 24th May. The remainder of the express party were expected to reach Mr. Patterson, at Daly Waters, on the 7th June. The Telegraph Department at Adelaide is now communicating with Tennant's Creek Station, a distance of 1,400 miles, as easily as with Melbourne.

The proposal made in the Assembly Cape Parliament, South Africa, to place the sum of £75,000 for the extension of telegraphic communication to the Diamond Fields, has been carried.

At a special meeting of the Chamber of Commerce, held at Port Elizabeth, on Wednesday last the Committee highly approved of the idea of bringing this Colony into telegraphic communication with Europe and the East by marine cable, *via* Mauritius, and engaged to support any practical scheme which might be suggested, having in view the landing of the cable at that port. The Committee were of opinion that the terminus of the cable should be fixed in Port Elizabeth, because this is the most centrally situated part in the Colony, and is also the chief emporium of trade in South Africa.—*Eastern Star, Graham's-town, July* 9, 1872.

We learn from the report of the Superintendent of Electric Telegraphs in Queensland, that at the close of last year there were fifty-one stations and 2,614½ miles of wire in the Colony; since then new lines have been completed from Wes Westbrook to Warwick, from Claremont to Springshire, and from Warwick *via* Leyburn and Inglewood to Gondiwindi.

CORRESPONDENCE.

To the Editor of the Journal of the Telegraph:

Would an operator, receiving a message for a party, with wrong address, but knowing who it was from, and their agent in this place, be justified in delivering to said agent, (with note of explanation), where it would take from one to two hours to have it corrected?

Answer.—It would be proper to obtain the correct address.

To the Editor of the Journal of the Telegraph.

If we receive a "red" message for a party, and cannot deliver it the next morning, the party being out of town, and we are therefore requested by his clerk to forward to him, how should we forward it from this office—at full or half rate? S.

Answer.—When you have delivered a message to the place of business of the party addressed, you have performed your whole duty. If the person to whom it is addressed is out of town, and his agent wishes it forwarded to him, he should state whether it should be sent at full or half rate.

In our issue of August 15th, 1872, the following inquiry was made: "Suppose a message to be left at an office on the morning of July 27th, dated 26th, the sender having paid for it and gone, must the message be transmitted as taken, or should the operator correct the date?" To which we replied, "That the operator should, in sending, state that it was filed on the 27th."

We should have added, however, that the receiving clerk should not take a despatch so dated, but that he should have required the customer to change the date when it was handed in, and thereby save the explanation or statement that it was filed on the 27th, and also, very probably, save a check error.

In the same issue the following query was put: "Suppose I receive a message August 1st, dated San Francisco, July 31st, must I include that message in August report, having sent in report for July?" To which we replied, "Yes, with special explanations."

We desire to call especial attention to the custom indicated by the above inquiry, as a cause, among many others, of the heavy, wearisome, profitless, nay, even unnecessary, labor of the check department. The person who put the above inquiry apparently closed his report when he closed his office on the night of the 31st, thinking that when *his* light was out that work was over for every one else; whereas, he should not close his report till the end of the second day of the ensuing month, in order that he may include in it delayed business. The books should not be closed on any day until there is a reasonable assurance that all back business is in.

Greenville is informed that when the two terminal offices on one wire are sending and receiving at the same time with the duplex apparatus, no intelligible signals will be produced upon an intermediate instrument.

Operator at Boston is informed that the letters Ahr, used at the commencement of a message, is an abbreviation of the word another.

Inquirer will find in the JOURNAL of September 16, full and explicit information in relation to the use of the new tariff book.

There are twenty-one words in the following message:

"Will be in Carthage at three P. M. Can you serve process in Dallas City to-night. Answer to T. W. & W. Junction."

Names of cities and places, when used to designate such cities and places, will be counted as one word. Dallas City is the name of a place, and is published as such in the Post Office Directory and in Lippincott's Gazetteer. T. W. and W. Junction is not the name of a place, within the meaning of the rule, but merely the description of a thing or of a location in a place, and is, therefore, to be counted for as many words as it contains.

TELEGRAPHY IN FRANCE.

Some statistics of telegraphic administration in France, recently collected and made known by M. Blavier, afford information of interest. The service is carried on by three distinct classes of employes; the general staff, the staff for maintenance and repairs, and the telegraphic clerks. The *etat-major* is composed of a Director, 3 Inspectors-General, 10 Divisional and 69 Inspectors.

In 1871 there were 41,248 kilometres of aerial lines, with about 119,405 kilometres of wires: also 571 kilometres of submarine cables, and 18½ kilometres of pneumatic tubes; making a total length of 41,837½ kilometres (26,000 miles), constructed at a total cost of £1,468,000, inclusive of the Algerian cables. There were 3,253 offices open, inclusive of 1,228 at railway stations, divided in three categories, viz.:—

1. Principal bureaux, about 200 in number, despatching not less than 140 to 150 messages daily, and employing from 4 or 5 to 25 or 30 clerks.

2. Secondary bureaux, about 350 in number, mostly situated at the chief town of the arrondisement, and concentrating the services of the next class.

3. The cantonal, municipal, and semaphoric bureaux, &c.

In 1870 the total number of messages forwarded amounted to 5,663,852, of which only 5 per cent. exceeded 20 words in length.

The annual cost of a kilometre of aerial line, comprising interest and maintenance, was 14 francs (about 18s. per mile); and the expense of a single despatch per kilometre was about the 800th part of a franc, equivalent to the rate of 133⅓ miles for a farthing.

Experience has shown that a few days' practice suffices for the acquisition of the power of working the needle telegraph; whereas three months' study is required before familiarity with the Morse apparatus is attained. For rapid transition (18 to 20 words per minute), for deciphering a despatch by the ear, and for a thorough mastery of the manipulation of the Hughes apparatus—the qualifications of a skilled operator—several years of uninterrupted practice are found necessary.

AN improved and more rapid method of telegraphic printing has been invented by Mr. R. Herring, who having been applied to by a Mr. Franklin for a means of sending phonetic signs by telegraph, he wishing to be able to print four symbols simultaneously, either all dots, all dashes, or any combination of the two; Mr. Herring found it would be possible to accomplish this by attaching eight keys to a modification of his present instrument, so arranged that four batteries, by means of four wires, should control four inking dials like that now in use.—*Mechanics' Magazine.*

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory and Province on the Continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, OCTOBER 1, 1872.

THE TELEGRAPHERS' ASSOCIATION.

In the last number of the JOURNAL we published the Address and Constitution of the Telegraphers' Association, the successor of the Telegraphers' Protective League, an organization which was gotten up for the purpose of securing within the grasp of a few designing men the control of the vast Telegraph interests of the country, and which was made use of for inaugurating upon the lines of the Western Union Company one of the most unjustifiable and reprehensible strikes ever attempted, and which, had it been successful, would have ruined the Telegraph business of the country, and caused irreparable injury to every branch of industry.

The designs of the authors of the present scheme are somewhat more cleverly disguised than they were in the former one, but no thoughtful person of average discernment can fail to perceive that they are identical. Under the guise of a pretended solicitude for the interests of the employés of the various Telegraph companies, its authors seek to obtain as before, the control of the entire telegraphic fraternity of the country. There is very little probability that the sophistical arguments of the chief managers of the present secret society can again deceive any of those who were thoughtlessly inveigled into the former one, and thereby induce them to joint the present organization; but they may succeed in deceiving some well intentioned but unreflecting persons not connected with the former organization, and induce them to join the present one from a mistaken idea of its purposes and tendencies. To such persons we commend the careful consideration of the following extracts from the Constitution of the Society, which shadow forth the real purposes of the originators and promoters of the plot:

"It shall be the duty of every member of the Association to cheerfully *acquiesce in all measures that may be duly initiated by the Council to which he belongs. The firm and unswerving loyalty of every member is the foundation of power, which must be maintained at all hazards.*

"The Association expects every member to perform his whole duty towards his employers, in accordance with the terms under which he was engaged, *provided he does not thereby conflict with a duly authorized order from the Councillor of the Council to which he belongs.*

Every candidate is required to bind himself not to reveal the names of the officers, or members, or the purposes of the Association, and to obey all orders issued by its officers.

It seems almost incredible that any intelligent man should be willing voluntarily to pledge himself in advance to blindly and unquestionably obey any order from any source whatever, but much more so that he should agree to obey the order of a secret and irresponsible organization, the purposes, instructions and acts of which he can have but a limited knowledge. What would be thought of the foresight of a man who should sign his name to a blank piece of paper and give it into the hands of a stranger to make such use of as he thought proper? But how much better is the prudence of the man who pledges himself solemnly to obey without question the mandate of a secret band of conspirators? How can any honest man engage to perform a service for one person, and then secretly bind himself to break such engagement whenever ordered to do so by another? And yet this is precisely what every member of this League solemnly promises to do.

When the former League culminated in the strike of three years ago, it transpired that the leading spirits engaged in it were in the employment of competing companies, the head centre being the manager of one of the city offices of a competing line. The rank and file were to some extent made up from the employés of the Western Union Company, while the officers were largely composed of persons in the employ of other companies. As stated in the address of the officers of the Company at the time, "the employés of the Western Union Telegraph Company, by joining an organization thus officered, have put themselves in the situation of an army which, by solemn and secret conspiracy, should bind itself to lay down its arms and surrender its cause at the bidding of and upon the signal of the commander of the enemy's forces."

No employé of the Company who has any respect for his reputation, or any regard for common honesty, will have any thing to do with this organization. It can under no circumstances do him any good, and may result in much harm. No company could knowingly accept the services of men who have pledged themselves to obey the mandate of such an organization, nor can any honest man engage himself to work for a company and conceal the fact of such an obligation as that required to be taken in joining the Telegraphers' Association.

When messages are received for delivery by special messenger, pains should be taken to have the service performed at the least possible cost; this, and no more, is to be charged for the service, and upon no account are Managers allowed to receive from messengers part of the delivery charge. This rule is imperative.

THE CINCINNATI EXPOSITION.

The Exposition now in progress in Cincinnati is, undoubtedly, the greatest ever held in the United States. While the articles on exhibition are entirely the product of American skill and industry, and chiefly that of the West, yet from its magnitude and importance it must take rank hardly second to the great International Expositions of London and Paris.

Profiting by the experience of former years, the management have erected new buildings surpassing in extent any heretofore erected in the United States for a similar purpose, and comprising an exhibiting space of about seven acres. In the arrangement of the various departments the convenience of both exhibitors and visitors has been carefully consulted, and an improved distribution of articles into groups adds largely to the general symmetry of the Exposition. A handsome fireproof structure, 62 by 160 feet, detached from the main building, is devoted to the Fine Arts department. The display of paintings, many of them of great value, of photographs and lithographs, is very fine.

Columns might be filled in the description of the various articles upon exhibition; but as it is with electrical and telegraph machinery that our interest chiefly lies,—the description is confined to that portion of the particular department in which these are to be found.

The Western Union Telegraph Company have on exhibition a splendid stock of telegraphic apparatus, embracing relays, sounders, and keys. They also exhibit the improved duplex instrument. There is no doubt that Mr. Stearns will be awarded the medal for this latter instrument as being the greatest improvement in telegraphy.

The Gold and Stock Telegraph Company exhibits the only perfect automatic printing telegraph instrument—that invented by Mr. G. M. Phelps. They also show a pair of Edison's Universal Printers for private lines, and a pair of Gray's Printers for the same purpose.

The Western Electric Manufacturing Company have a fine display of all kinds of telegraph machinery and supplies.

Mr. E. G. Gilliland, of the Western Union office in Cincinnati, who is in charge of the machinery above mentioned, exhibits a small Sounder and Key for students and short lines, for which it seems well adapted.

Selden's Automatic Stock Printer is exhibited by Mr. E. C. Armstrong.

F. L. Pope & Co., of New York, exhibit their "Nonpareil" instrument and attachments. Also the electrical railroad signals invented by the head of that firm. These signals, by the way, are something better than the average of such productions, and have been adopted by the Pennsylvania Central Railroad Company, and doubtless will shortly be in general use throughout the country.

H. D. Rogers & Co., of Cincinnati, have a case well filled with telegraph apparatus of various kinds, the only novelty noticable among them being the Rogers-Gilliland Dial Machine. This is a very simple and cheap instrument. It has a step by step motion and is worked by an ordinary Morse key.

The Putt Mechanical Instrument, for students, is also on exhibition. This instrument is too well known to need description in these columns.

Several "Burglar Alarms," and numberless magnetic instruments for medical purposes, are also on view.

There is considerable telegraph business transacted at the fair. The telegraph office in the building (of

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course Western Union) is in charge of Master John McCabe, a gentleman who has safely matured thirteen summers. The writer has seen many worse operators of far greater pretensions, old enough to be this lad's father.

The number of visitors to Cincinnati, attracted by this Exposition, is immense; and the beneficial results to the city, at present and to arise, is hardly within computation.

It is announced that the Exposition will remain open to the public until Saturday, October 5, but its success proving so great, it will doubtless be continued to a much later day.

THE VIENNA EXPOSITION.

The Universal Exposition to be held at Vienna, Austria, next year, promises to be much larger and more comprehensive than the similar exhibitions held in London and Paris. The great building is advancing toward completion. The first of July was the last day for receiving applications for space on the part of exhibitors. It is said that 15,000 Americans will send articles to this exhibition. This exceeds by several thousands the number of English exhibitors at either of the exhibitions held in London. It also exceeds the number of French exhibitors at the Paris exposition. Among the requests for space at the Vienna fair, 3,000 came from Hungary, 8,000 from the North German Empire, and 800 from Belgium. Each of the Grand Divisions of the earth, and nearly every county in each of them will be represented. It is said that the agricultural implement makers in this country will make an immense display, partly with a view of introducing their machinery to the favorable notice of the farmers of Eastern and Central Europe.

PRIVILEGED TELEGRAPH COMMUNICATIONS.

The secrecy of the telegraph has been on trial in California. In a San Francisco court, the Superintendent of the Western Union Telegraph Company appeared in answer to a subpœna requiring him to produce a book in one of the telegraph offices, containing copies of certain messages transmitted to San Francisco, to be used in evidence in a trial. The counsel for the Superintendent, Mr. Gamble, argued that this was an attempt to extend the power of subpœnas beyond legal limits. If the witness *were the custodian of the book he is forbidden by the law providing for the secrecy of telegraphic dispatches from revealing its contents.* The book-holder is to be summoned, and the judge is going to take the matter into consideration as to how far telegraphic secrecy is obligatory. The question whether certain communications to telegraph companies are, or not, what are technically known as "privileged communications,"—which the law has always held sacred from disclosure,—has heretofore arisen, collaterally, in a few instances in other States. We do not recall, however, that the question ever became of enough importance to invoke the authority of appellate courts,—*i. e.* of the last resort,—to settle it, although it may, likely enough, have been abjudicated. Generally, the proof relief upon as shown by and in the communications, has been found *aliunde* and by more direct testimony.

AMONG the pensions granted by the British Government during the year ending the 20th of June 1872, was one of £100 per year to William Fothergill Cooke, for services in the telegraphic system.

THE Western Union Telegraph Company will use over 150,000 miles of telegraph wire this year.—*Workingmen's Advocate.*

Wonder where they got that little item from.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
October 1, 1872.

To all Offices on W. U. Lines:

Hereafter, in the arrangement of the tariff circular, a statement of the changes in rates, names of offices, general information and names of new offices, &c., will be given in such a manner as shall render the entry of the same in the tariff book a work of much less labor and difficulty than heretofore.

Under the head of GENERAL INFORMATION, will be given all changes in rates, (except special rates) changes in names of offices, offices closed, changes in checking and general information *for each State*, arranged in the order in which the names of the offices are given in the tariff book.

Under the head of NEW OFFICES, new offices by States on W. Union lines and new offices on other lines, with tariff for the latter, will be given. Other lines offices will be designated by an asterisk. (*)

All notices given in the circular should be entered immediately upon the receipt of the JOURNAL, otherwise, confusion in checks and rates, and complaint from customers must be the result.

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Offices in Indiana, Kentucky, Michigan and Ohio will make the following change on their STATE RATES:

To Idaho Terr., $4.00. New Mexico Terr., $4.00.
Montana Terr., $4.00.

All offices in Central and Southern Divisions, except offices in Virginia, North Carolina and South Carolina will make their rate to squares 101, 110 and 129 equal to their rate to square 120 *if they are at present less than to that square.*.

That part of the INSTRUCTIONS relating to Half Rate messages, printed on page VI. of the new tariff book, which conflicts with *Executive Order No.* 141, published in last JOURNAL, is hereby revoked.

ALABAMA.

Birmingham, now W. Union, square 294.
Chehaw, closed.

Messages may be taken for the University of Alabama, Alabama Insane Hospital and Ursuline Convent, Ala., to be elivered from Tuscaloosa, Ala. Twenty-five cents for delivery should be collected.

CALIFORNIA.

Alameda, closed.		Mountain View, closed.	
Alta,	"	New Castle,	"
Bayley's Ranch, closed.		Rocklin,	"
Blue Canon,	"	Roseville,	"
Cisco,	"	Summit,	"
Coloma,	"	Wheatland,	"
Menlo Park,	"		

CONNECTICUT.

Thompson, closed. Pequot House, closed.

ILLINOIS.

Cobden, closed. Cornland, closed.

LOUISIANA.

Vermillion Bayou, re-opened.

MICHIGAN..

Greenwood.....195 13 307 Chicago, Ill.

Messages may be taken for South Saginaw, Mich., to be delivered from East Saginaw. Charges for delivery, 25 cents, should be collected.

NEVADA.

Carlin, closed. Verdi, closed.

NEW JERSEY.

Chatham, closed. Three Bridges, ck. Flemingtan, N. J.

NEW YORK

Bloomingdale should read... 30 2 39 Whitehall, N. Y., Mont. Co.
Catskill Mountain House, closed.
Cozzen's Hotel, West Point, closed.
Essex, re-opened.
Lake Mahopac, closed.
Lake Mohonk, closed.
Martin's should read.....30 2 39 Whitehall, N. Y., Mont. Co.
Paul Smith's should read.....30 2 39 Whitehall, N. Y., Mont. Co.
Trenton Falls, closed.

OHIO.

Little Mountain, closed.

PENNSYLVANIA.

Catawissa, now Other Lines....35 3 84 Rupert, Pa.
Darby closed. Ridley Park, closed.
150 Union, Pa., P. O. A., Union City.

UTAH.

Promontory, closed Terrace, closed.
Schell Creek, closed.

VIRGINIA.

Capon Springs, closed. Jordon's White Sulphur Spr'gs, closed.
Jerry's Run, closed. Yellow Sulphur Spr'gs, closed.
Jordan Bridge, alum, Spr'gs, closed.

WEST VIRGINIA.

Berkeley Springs, closed.

NEW OFFICES

ALABAMA.

285 Blount Springs. 267 Salem.
294 Lomax.

BRITISH NORTH AMERICA.

* Fort Garry.....225 15 307 Chicago, Ill.

Note.—Enter B. N. A. offices on same page with British Columbia.

CALIFORNIA.

Concord. Soquel.
Merced. Yountville.
Mission of San Jose.

ILLINOIS.

298 Aroma. 346 Garden Plain.
337 Barclay. 368 Mounds.
307 East Batavia. 337 Sherman.
346 Fenton. 327 Saybrook.

IOWA.

454 Tip Top. 367 Lost Nation

KANSAS.

521 Peace.

KENTUCKY.

223 Carlisle. 243 Shawhan.
223 Marshalls.

LOUISIANA.

* Bayhi Plantation.....100 5 375 New Orleans.

MAINE.

9 Warrington.

MASSACHUSETTS.

40 Richmond.

NEBRASKA.

* Harvard.....140 9 474 Plattsmouth.

NEVADA.

Schellburne.

NEW YORK.

83 Campbell.

OHIO.

170 Phillipsburg.

OREGON.

Aurora. Jefferson.
Comstock's Mill. Shedd's.

Offices having "Special Sheet A" will check Triumph, Pa., same as "special rate" to Tidioute, Pa.

ATLANTIC CABLE BUSINESS.

We are notified by the New York, Newfoundland, and London Telegraph Co., that on and after October fifteenth, the rates for messages from London, via Teheran and Falmouth, will be as follows:

Hong Kong and Shanghai, $30.
Nagasaki, $35.

Half rate for every additional ten words or fraction thereof. Messages cannot be sent via Russia.

WILLIAM ORTON, President.

BORN.

BRICE—At New Waverly, Ind., Sept. 19, 1872, to John Brice, Jr., Agent and Operator T. W. and W. Ry., a daughter.

MARRIED.

MOSS—FORCE.—On Saturday, Aug. 31, 1872, at the residence of the bride's father, Lacolle, P. Q., J. L. Moss, Receiver W. U. Tel. Office, St. Alban's, Vt., to Ida Alice, daughter of T. Force.

O'KEEFE—TOWELLE.—On Monday, June 10, 1872, A. W. O'Keefe, Operator, Forestville, Mich., to Agnes Towelle, of same place.

VICKERS—DILLEHAY.—At Danville, Ky., Sept. 17, 1872, J. B. Vickers, Manager W. U. Tel. Office, to Lizzie Dillehay, daughter of the late Col. T. J. Dillehay.

DIED.

HOTALING—At Chetopa, Kansas, Johnnie R., only son of Ben. S. and Gertie R. Hotaling, aged 5 months and 19 days.
"The Lord gave; the Lord has taken away. Blessed be the name of the Lord."

OTT—At Bloody Run., Pa., Sept. 23, 1872, of typhoid fever, William C. Ott, late Agent and Operator.

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THE SERVICE.

WESTERN UNION TELEGRAPH CO.,

July, 1872.

RESIGNATIONS.

Henry Center, Gloucester, Mass.
J. T. Wallace, Hampton, N. H.
C. C. Benson, Lewistown, Me.
Geo. D. Crane, Mattawamkeag, Me.
L. M. Welch, Pigeon Cove, Mass.
L. S. Hayse, White River Junction, Vt.
M. A. Jackson, Birmingham, Conn.
J. Fidler, E. Chatham, N. Y.
Chas. E. Lincoln, Newport, R. I.
J. C. Bonton, Rye, N. Y.
Geo. Dunham, So. Adams, Mass.
Chas. L. Fox, So. Framingham, Mass.
M. Davin, Boston, Mass.
H. J. Pettingill, Boston, Mass.
P. J. McDermott, Boston, Mass.
F. Murphy, Brewsters, N. Y.
C. B. Darling, Greene, N. Y.
E. A. Harvey, Rochester, N. Y.
B. H. Griffin, Suspension Bridge, N. Y.
G. S. Shipp, (Salina Office) Syracuse, N. Y.
J. Schmell, Binghampton, N. Y.
C. D. Hammond, Susquehanna, Pa.
W. C. Pease, Waverly, N. J.
H. S. Austin, Cairo, Ill.
E. P. Lyman, Dubuque, Iowa.
E. L. Smith, Jacksonville, Ill.
F. M. Wheeler, Waterloo, Ia.
F. A. Randall, Chicago, Ill.
E. J. Stephenson, "
G. W. Huddleston, "
D. M. Tillotson, "
W. H. Davey, "
S. A. Judkins, Brownsville, Neb.
Emma Stanton, Jefferson City, Mo.
Miss C. D. Littlejohn, Topeka, Ks.
S. A. Judkins, " "
John P. McClare, St. Louis, Mo.
Walter S. Peirson, "
Chas. Maginnis, "
J. A. Myers, Cheyenne, Wy. T.
J. H. Harcourt, Cimarron, N. M.
John Valie, Fort Benton, Mon. Ter.
W. C. Annor, Golden City, Col.
E. Everts, Omaha, Neb.
B. F. Whitma
A. H. Keller, Phillipsbury, Pa.
John Brien, Reemerton, Pa.
J. A. Duncan, Sandy Creek, Pa.
J. Berryman, Tideonte, Pa.
E. A. Keene, Titusville, Pa.
J. L. NcBretney, Pittsburgh, Pa.
S. J. Armstrong, Pittsburgh, Pa.
W. E. Schroeder, Petroleum Centre, Pa.
Robert Livingston, Buffalo, N. Y.
J. Gallagher, " "
A. G. Chapin, " "
A. F. Douglass, Cleveland, O.
John Ashurst, " "
C. T. Huntington, Crestline, O.
F. G. Brown, Toledo, O.
E. Peel, Teledo, O.
C. S. Johnson, Indianapolis, Ind.
F. Pitcher, Logansport, Ind.
Wm. Chettle, New Albany, Ind.
A. C. Barker, Terre Haute, Ind.
R. N. Morton, Catlettsburg, Ky.
E. C. Armstrong, Cincinnati, O.
C. A. Allen, "
C. M. Cambuin,
L. D. Hamilton,
C. A. Peel,
C. L. Snyder, "
W. L. Keeper, "
O. G. O'Gara. "
R. S. Tankerly, Greenville, Tenn.
J. C. Duggan, Augusta, Ga.
C. L. Hatch, Jr., Goodmans, Fla.
C. L. Fry, Pensacola Junction, Fla.
L. G. Nichols, Amite City, La.
J. H. Bogard, Terry, Miss.
J. T. Floyd, Stanton, Tenn.
W. C. Pharr, Enterprise, Miss.
B. H. Lucas, Grand Junction, Miss.
W. H. Polk, Macon, Miss.
D. Saffold, Scooba, "
J. D. Mitchell, Tupelo, Miss.
A. W. Morris, Elizabethtown, Ky.
J. H. Byrne, Lexington, Ky.
G. L. Spink, Mumfordsville, Ky.
G. M. Robertson, Huntersville, Ark.
W. W. Shannon, Monroe, La.
T. J. Russell, Carricetos, Tex.
G. C. Osborne, Chappell Hill, Tex.
C. Dwyer, Galveston, Tex.
E. J. Smith, " "
W. A. Kenman, Jewett, Tex.
W. H. Ward, Willis, "
W. B. Ector, Palestine, "
D. G. Mills, New Orleans, La.

TRANSFERS.

Name.	*From what Office.*	*To what Office.*
E. J. Brown	145 Broadway, N. Y.	Saratoga, N. Y.
Louis P. Pine	" "	Birmingham, Conn.
Helen E. Smith	" "	Morristown, N. J.
R. F. Brien	Claflins, N. Y.	B'dway & 6th Av., N. Y.
Thomas Brown	Metropolitan Hotel.	21 Wall St., "
S. C. Burns	21 Wall St., N. Y.	145 Broadway, "
P. J. Casey	145 B'dway, "	Relief Service, "
George Cromwell.	Cotton Exchange, N. Y.	145 B'dway, "
H. E. Crowell	" "	Earle's Hotel, "
Josie G. Curtiss.	Roslyn, L. I.	117 Worth St., "
Mary S. Dickenson	117 Worth St., N. Y.	Brooklyn, E. D.
P. H. Flynn	145 B'dway, N. Y.	Stewart's N. Y. City.
E. A. Hopkins	Earle's Hotel, "	Brooklyn, L. I.
W. G. Magowan.	Fulton Market, N. Y.	145 B'dway, N. Y.
Jas. W. Mead	21 Wall St., N. Y.	Long Branch, N. J.
J. J. O'Connor	Stewart's, "	145 B'dway, N. Y.
Helen A. Price	Worth & B'dway N. Y.	" "
J. D. Riddle	Canal St., N. Y.	Westchester House, "
Emily Ross	145 B'dway, "	Brooklyn, E. D.
Herbert Smith	B'dway & 6th Av., N. Y.	145 B'd'y, N. Y.
J. S. Stewart	Westchester House, N. Y.	" "
Jennie L. Walton.	Brooklyn, E. D.	" "
W. H. Wandle	145 B'd'y, N. Y.	5th Ave. Hotel, "
L. W. Hoyt	Annapolis, N. S.	Halifax, N. S.
N. M. Cobb	Plymouth, N. H.	Portland, Me.
D. D. Stickney	Portland, Me.	Plymouth, N. H.
Chas. E. Tapley.	Westfield, Mass.	Springfield, Mass.
Geo. S. Marceys.	Boston, Mass.	Bangor, Me.
E. Merrick	Williamstown, Mass.	Hudson, N. Y.
H. H. Doolittle	Utica, N. Y.	Sharon Springs, N. Y.
O. Crary	Georgetown, Col.	Dubuque, Ia.
W. P. Dinsley	Keokuk, Ia.	Peoria, Ill.
John Q. Mason	Peoria, Ill.	Chicago, Ill.
H. W. Goewey	Chicago, Ill.	Omaha, Neb.
Frank J. Gates	Atchison, Ks.	Kansas City, Mo.
H. C. Mahoney	Kansas City, Mo.	Atchison, Mo.
Henry Warren	Lawrence, Ks.	St. Louis, Mo.
Frank W. Farley.	Kansas City, Mo.	Topeka, Ks.
Eugene Powers.	St. Louis, Mo.	Lawrence, Ks.
A. M. Bush	Hughes, Col.	Golden City, Col.
P. J. Phippen	Omaha, Neb.	Cheyenne, Col.
E. N. Snyder	"	Salt Lake, Utah
W. J. Hunter	Foxburgh, Pa.	Petrolia City, Pa.
D. W. Weilds	Petroleum Centre, Pa.	Titusville, Pa.
L. L. Smith	Titusville, Pa.	Pittsburgh, Pa.
J. A. Torrance.	Pittsburgh, Pa.	Petroleum Centre, Pa.
J. R. Taltoval	Sandusky, O.	Cleveland, O.
W. P. Campbell.	Yellow Sulphur Sp'gs, Va.	Greenville, O.
L. A Pippen	Beaufort, S. C.	Washington, Ga.
Z. Ross	St. Marks, Fla.	Tallahassee Depot, Fla.
F. Hawkins	Auburn, Ky.	Mumfordsville, Ky.
Thos. Curry	Memphis, Tenn.	Monroe, La.
Jas. Huggins	Waynesboro, Miss.	Enterprise, Miss.
G. D. Meatz	Glasgow June., Ky.	Elizabethtown, Ky.
Albert Oehler	Ledbetter, Tex.	Chappell Hill, Tex.
J. S. Burtin	Corsicana, "	Dallas, "
J. K. Healy	Chef Menteur, La.	Rigolets, La.
C. D. Thomas	New Orleans, "	Nashville, Tenn.
John E. Wright.	" "	New York, N. Y.
W. J. Landy	" "	Cincinnati, O.

A NEW TELEGRAPH LINE BETWEEN ENGLAND AND NEW YORK.

The success attending Atlantic telegraphy has made people express wishes for more cables and reduced tariffs—the latter being so high as to be somewhat exclusive—and to enable the public to send messages at a less rate, the Great Western Telegraph Company was projected for the purpose of laying, during the course of next year, a cable from England to New York *via* Bermuda. This endeavor so far succeeded that the public took the matter up, and a contract was signed with Hooper's Telegraph Works for the manufacture and the laying of the cables, which are now in course of construction.

The following particulars are given in *Engineering:* The proposed route for the cable is entirely new. The cable will start from a convenient point at the Land's End to the Island of Bermuda, and from thence to New York. From Bermuda, a cable will in the course of time be laid to St. Thomas to connect with the network of West Indian cables, and there are subsequent intentions of connecting Bermuda with the coast of South America, which route is stated to possess the great advantages of connecting Brazil both with England and with New York by direct lines. The distances are as follows: Land's End to Bermuda, 3,225 knots; Bermuda to New York, 762; total, 4953.

In the existing Atlantic cables, the insulating medium is that of the well known aud generally used material, gutta-percha. In the present instance, however, the directors have decided to employ india rubber in that form known as Hooper's material, as the insulator for their cable. Hooper's core has of late years been largely adopted, as for instance, for the Persian Gulf cable, the various English cables belonging to the Great Northern Company, and more recently the China and Japan extensions. The success of the present cable, being the longest stretch of cable yet attempted, will prove of material moment in the great question of gutta percha *versus* India rubber.

Conductor.—The conductor consists of a strand of seven tinned wires of annealed copper of the best quality and manufacture, and the resistance of a nautical mile will not exceed 4·3 ohms at the standard temperature of 75° Fahr.; this represents a conductivity of 92½ per cent. of pure copper. The copper strand will weigh for this section 300 lbs per knot.

Dielectric.—The conductor will be insulated with material to the weight 250 lbs. per knot. This may be briefly stated to be pure rubber next the wire, a separating medium, then coatings of vulcanized rubber, and finally a jacket, the whole process being peculiar, but representing finally a compact insulated core.

The insulated conductor, or core, is protected with a serving of India rubber felt, and subsequently with a serving of jute yarn, in quantity according to the requirement of the various types of cable.

The manufacture of this cable progresses steadily. Sir William Thompson and Professor Fleeming Jenkin are electricians and engineers to the company.

We are again called upon to announce the death of two members of the Telegraphers' Life Insurance Association.

Fred. A. Randall, aged 21 years, (certificate No. 726,) died of inflammation of the bowels, at Ann Arbor, Mich., on Sept. 13th, after four months' illness. He was employed as operator in the Western Union office at Ann Arbor.

Andrew Ainsworth (certificate No. 850) died of consumption, at Greencastle, Ind., on Sept. 16th, after an illness of several months' duration. Previous to his death he was employed as operator at the depot office of the T. H. & I. R. R. Co. at Greencastle.

Notice is hereby given that the Annual Meeting of this Association will be held at 145 Broadway, New York, on Friday, the first day of November next.

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 22. NEW YORK, OCTOBER 15, 1872. WHOLE NO. 119.

TANGENT GALVANOMETER.

Mr. Pouillet was the inventor of this apparatus, and was the first to make use of it to measure the strength of electric currents.

Upon a wooden table K K is (fig. 1) placed parallel to the plane of the magnetic meridian a circular ribbon of copper L L from 15 to 20 inches in diameter, 1 inch wide, and $\frac{1}{12}$ of an inch thick. This ribbon is surrounded by a silken thread and its two extremities are vertically bent so as to dip into two glass vessels filled with mercury V V′, connecting with the poles of a battery.

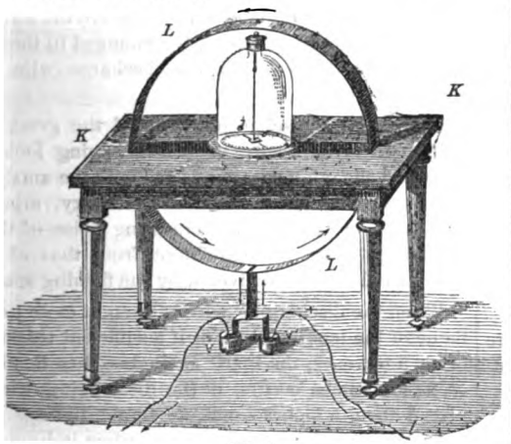


Fig. 1.

In the centre of the circle *a short and massive needle* is suspended, by means of a thread without torsion. A very light copper or wooden index *d*, perpendicularly fixed to the axle of the needle, indicates on a graduated horizontal scale the angular movements of the magnet.

When the current passes the needle is deviated; on account of the breadth of the copper ribbon L L, and the shortness of the needle, the resultant of the actions exercised by the cylindrical current on its poles is always nearly perpendicular to the magnetic meridian.

Consequently if we call *i* the intensity of the current, or its action on the needle placed in the plane of the magnetic meridian, this action will become $i \cos d$, when the needle has reached an angular deviation *d*. But in this position, the directive power of the needle equal and opposite to the action of the current is $f \sin d$. Thus we have:

$$i \cos d = f \sin d;$$

Whence

$$i = f \frac{\sin d}{\cos d},$$

Whence, finally:

$$i = f \text{ tang } d.$$

With this galvanometer, the strengths of the currents successively transmitted over a circuit bear the same relations as the tangents of the angles of deviation of the magnetic needle.

More recently Mr. Gaugain modified in a very successful manner the construction of the tangent-galvanometer, based upon the following theorem, deduced by Mr. Bravais from the formula of Ampère:

"If a magnetic needle is submitted to the action of a circular current set up in the plane of a magnetic meridian, and the centre of the needle occupies the apex of a right cone, having for its base the circular current, the tangents of the needle's deviations are almost absolutely proportioned to the strength of the current, if the height of the cone is equal to a fourth part of the diameter of the base."

Experiments show that with needles of 1¼ to 1½ inches in length, and circular currents whereof the radius is at least thrice the length of the needle, when the conditions which are enunciated in this theorem are fulfilled, the limit of the digressions do not extend beyond $\frac{1}{1000}$; an amount so insignificant that it may be altogether disregarded in practice.

By these means tangent-galvanometers may be constructed, which are at the same time very accurate and very sensitive, and the diameter whereof need not be more than 7 or 8 inches.

In these new tangent galvanometers (fig. 2) the magnetic needle, its index and its horizontally divided circle are carried by a stand P, which can be removed from or drawn nearer to the circular frame A, around which is rolled the insulated copper wire *t* and *t′*. The point of suspension of the needle is on a horizontal placed in the centre of the frame A perpendicularly with its median section, and at a distance from this centre equal to *a fourth part* of the diameter of the circular current.

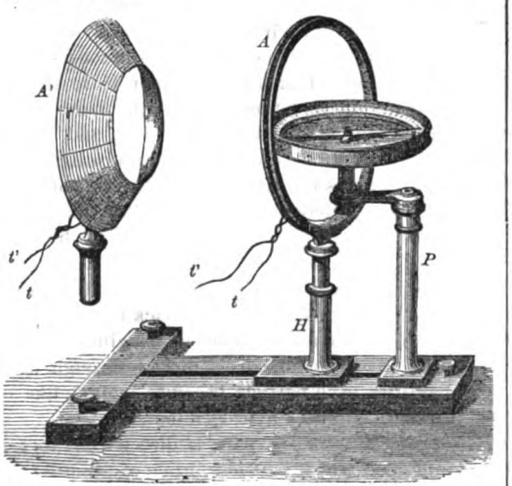


Fig. 2.

Mr. Gaugain, starting from the same principles, has constructed *tangent multiplicators*, by means of which the strength of the feeblest currents can be measured with great accuracy.

In fact, for a fixed position of the magnetic needle, the geometrical place of all the circles suitable for the formation of galvanometers is a straight cone, whose apex is in the centre of the needle, and whose angle is determined, the relation of its height to its base being known. If thus on the surface of this cone an insulated copper wire is rolled, and the current is transmitted through it, each convolution of the wire tends to produce a deviation of the needle, whose tangent will be proportional to the strength of the current. It is evident, that the *conical multiplicator*, formed by the reunion of these convolutions will possess the same properties.

In order to transform the tangent galvanometer into a tangent multiplicator, it is sufficient to detach the circle A from its stand H, and to have it substituted by the trunk of a cone A′, figure 2, on the outside surface whereof a fine insulated wire *t* and *t′* is rolled. These conical multiplicators are very sensitive, and very convenient for practical work. The centre of suspension of the needle must always occupy the apex of the trunk of the cone A′.

The modifications introduced by Mr. Gaugain in the construction of the tangent galvanometer renders his apparatus superior to all others for exact measurements.

Messrs. Knox and Shain, of Philadelphia, manufacture the Gaugain galvanometer with either one or two cones, as desired. Each cone is covered with two wires of equal size and length, so that the instrument may be used as a differential galvanometer, if desired.

Several of these instruments are employed in the service of the Western Union Company, and are found very useful and convenient, especially for measuring the internal resistance of batteries, for which, they are unequalled by any other apparatus in use.

CONSTANT QUANTITY BATTERY.

In a letter to the *Mechanics' Magazine*, Mr. H. Highton communicates the following as the result of his endeavors to find a constant quantity battery free from the objections attending the use of the Grove or Bunsen element. He says:—

"After a trial of numerous combinations to take effectually the place of a Grove or Bunsen battery, the fumes of which are so noxious, and of a Bichromate battery, which is both expensive and shows a good deal of polarization, I find the following the best combination.

For negative, carbon packed in granulated and peroxide of manganese with dilute sulphuric acid, say 25 per cent., and a little nitric and chromic acid, (or bichromate) added. The chromic acid absorbs the nitrate oxide fumes, and the combination readily takes the oxygen from the peroxide. I prefer a solution of common salt and zinc (or iron) for positive, as the salt is both more powerful than dilute acid, and prevents local action. It is well to have the cells of a good size. I am, &c.

H. HIGHTON.

Putney, September 16.

P.S.—I had the opportunity the other day of trying my telegraphic system on 150 miles of uninsulated wire under water, and found it presented no difficulty. I hope in a few days to try through 600 or 700 miles.

THE LAST NOVELTY IN PATENTS.—Three Chinese have taken out a patent at Paris for the invention of a new automatic and autographic continuous Telegraphic Instrument, by the aid of which apparatus the despatch is transmitted to the receiver as an exact fac-simile of the transmitter's autograph

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SOME EXPERIMENTS WITH THE GREAT INDUCTION COIL AT THE ROYAL POLYTECHNIC.

BY JOHN HENRY PEPPER, F. C. S., ASSOC. INST. C. E.

The Large Induction Coil.

The length of the coil from end to end is 9 feet 10 inches, and the diameter 2 feet; the whole is cased in ebonite; it stands on two strong pillars covered with ebonite, the feet of the pillars being of a diameter of 22 inches. The ebonite tubes, &c., are the largest ever constructed by the Silver Town Works.

The total weight of the great coil is 15 cwts., that of the ebonite alone being 477 lbs.

The primary wire is made of copper of the highest conductivity, and weighs 145 lbs.; the diameter of this wire is 0·0925 of an inch, and the length 3770 yards. The number of revolutions of the primary wire round the core of soft iron is 6000, its arrangement being 3, 6, and 12 strands.

The total resistance of the primary is 2·201400 British Association units, and the resistances of the primary conductors are respectively—For three strands, 0·733800 B. A. U.; six, 0·366945 B. A. U.; twelve, 0·1834725 B. A. U.

The primary core consists of extremely soft straight iron wires 5 feet in length, and each wire is 0·0625 of an inch in diameter. The diameter of the combined wires is 4 inches, and the weight of the core is 123 lbs.

The secondary wire is 150 miles in length; it is covered with silk throughout, and the average diameter is 0·015 of an inch.

The total weight of this wire is 606 lbs., and the resistance 33,560 B. A. units. The length of the secondary coil is 50 inches, and the insulation throughout is calculated to be 95 per cent. beyond that required. The secondary wire is insulated from the primary by means of an ebonite tube of ¼ an inch in thickness and 8 feet in length.

The length of the secondary coil is 54 inches, the diameter is 19 inches, and without the internal ebonite tube containing the primary wire and iron core it is a cylinder 19 inches in diameter and 6 inches thick.

The condenser, made in the usual manner with sheets of varnished paper and tinfoil, is arranged in six parts, each containing 125 superficial feet, or 750 square feet of tinfoil in the whole.

A large and substantial made contact breaker, detached from the great coil and worked by an independent electro-magnet, was constructed and worked very well with a comparatively moderate power of 10 or 20 large Bunsen's cells; when, however, the battery was increased to 30 or 40 cells; it became unmanageable.

A Foucault break, with the platinum amalgam and alcohol above it, was now tried, and answered very much better than the ordinary contact breaker; there was no longer any burning or destruction of the contact points, although the great power of the instrument appeared to cause continued decomposition in the water of the alcohol placed above the platinum amalgam; and every now and then the spirit was violently ejected, probably by explosion of the mixed gases taking place in the amalgam, in which they collected in bubbles; the alcohol constantly took fire and had to be extinguished. A large and very strong glass vessel (in fact, an inverted glass cell belonging to a bi-chromate battery) was bored through, and the neck fitted into a cap with cement, a thick wire covered with platinum being inserted in the bottom; the platinum amalgam was poured on this, and over it a pint or more of alcohol; the contact wire was also very thick and pointed with a thick stud of platinum, and, being attached to a spring, contact was easily made and broken. Explosions did not occur, flashes of light could be seen between the amalgam and the alcohol, and the height of the column of the latter prevented the forcible ejection of the spirit, which no longer took fire. The break was used for eight hours in a continuous series of experiments.

The Bunsen's battery used in the experiments was made with the largest porous cells that could be obtained, and each cell contained about one pint of nitric acid.

Some experiments were tried with the battery arranged for intensity, and used with the complete condenser of 750 square feet of tinfoil and 1500 square feet of paper. At first five cells were used, and these gave a spark 12 inches in length. The number of cells were gradually increased until 50 were in operation, when a spark from 28 to 29 inches in length was obtained.

In order to ascertain whether any variation in the size of the condenser would effect the length of the spark, a number of experiments were tried; and it was found that when half the condenser was used, the spark increased in length up to twenty cells, but not after.

Experiments were now tried to ascertain whether any increase in the length of the spark could be obtained by arranging the battery and the primary coil for *quantity*, but no material advantage was obtained by this arrangement; even where three groups of cells were connected a decrease in the length of the spark is observed when compared with the 45 or 50 cells arranged for intensity, the difference being as 20 to 28.

The spark obtained from the large coil is thick and flame-like in its appearance, and therefore it will be alluded to as the "flaming-spark."

When the discharging point and circular plate are brought within 6 or 7 inches of each other, the flaming nature of the spark becomes still more apparent.

Two light yellow flames curving upwards appear to connect the opposite poles. If a blast of air from powerful bellows is directed against a flaming spark, the flaming portion can be blown away and increased in area, and thin wiry sparks are now seen darting through it, sometimes in one continuous stream, at another time, divided into three or more sparks, all following the direction in which the flame is blown.

The flaming spark is very hot, and if passed through asbestos (supported on an insulating pillar), quickly causes the latter to become red-hot.

When powdered charcoal is shaken from a pepper-box into the flaming spark in a vertical line and in considerable quantities, the greater part of the light is obscured, and the whole form of the flaming spark presents the appearance of a black cloud with a line of brightly ignited particles fringing the bottom parts. If the charcoal is dusted through in small quantities, each particle becomes ignited, like blowing charcoal into a hydrogen flame.

When the flaming spark is directed on to a glass plate upon which a little solution of lithium chloride is placed, the latter colors the flame upwards to the height of 3 or 4 in the most beautiful manner; and if the point of the discharge is tipped with paper, or sponge moistened with a little solution of sodium chloride, the two colors (the yellow from the salt, and the crimson from the lithium) meet each other, a neutral point being found about half-way, and thus illustrating apparently the dual character of electricity, and that + passes to − electrical, and *vice versa*.

The flaming spark can be obtained in perfectly dry air.

Whilst passing through common air, if blown against a sheet of damp litmus-paper, the latter is rapidly changed red. In order to ascertain whether the acid product was nitric acid, the flaming spark (9 or 10 inches in length) was passed through a tube connected by a cork and bent tube with a bottle containing distilled water, from which another tube passed to the air pump; on drawing the air slowly over the spark, and passing the former into the bottle, nitric acid was obtained in large quantities, so much so that it could be detected by the smell and taste, as well as by the ordinary tests. The popular notion that nitric acid is always produced during a thunder-storm would therefore appear to be correct. To determine the effect of a cooling surface on the flaming spark, a hole 1¼ inches in diameter was bored through a thick block of Wenham Lake ice, and the spark passed through the air in the tube of ice; no change took place, and the spark was still a flaming one.

When the spark was received on the ice, it lost its flaming character, and became thin and wiry, spreading out in all directions.

If the discharging wires were tipped with ice, the spark was always flaming when any thickness of air intervened between them. Even over the ice, if the spark passed a fraction of an inch above the surface, it was always a flaming one, but changed to the thin spark when the point of the discharge wire was thrust into the ice.

If one of the discharging wires of the great coil is brought to the centre of a large swing looking-glass and the other wire connected with the amalgam at the back, the sparks are thin and wiry, arborescent, and very bright; the crackling noise of these discharges being quite different from that of the heavy thud or blow delivered by the flaming spark.

When the discharging wire is brought close to the flame of the looking glass, or if a sufficient thickness of air intervenes, the spark again becomes flaming; or, as sometimes occurs, if the discharging wire is placed about 5 inches from the frame, the spark is party flaming and part wiry, *i. e.*, when it impinges on the glass.

The spectrum is a continuous one with the sodium-line.

When the blast of air is used, and the wiry sparks made apparent, then the nitrogen-line appears.

The flaming spark has been ascribed by some experienced observers to the incandescence of the dust in the air, and especially sodium chloride.

To ascertain whether the "flaming spark" could be obtained with a small number of cells, the large Bunsen's battery was reduced to three cells, and it was found that no appreciable spark could be produced when the whole primary wire was used with less than five cells.

By reducing the length of the primary wire, and using the four divisions separately, with five cells, the spark was wiry, and varied from 4½ inches to 6½ inches; with ten cells it was wiry, and varied from 8½ to 9½; in the latter the spark was slightly flaming. With fifteen cells the spark was slightly flaming, and varied from 10 inches to 11⅛ inches. With 20 cells a flaming spark varying from 11½ inches to 12½ inches was obtained.

When the two wires from the secondary coil are placed in water, no spark is perceptible, even when the wire was brought very close together, until they touch.

If the negative is passed through a cork, on which a glass tube (a lamp glass) is fixed containing a depth of 5 inches of water, and the positive wire is brought within half an inch of the surface of the water in the

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tube, it becomes red-hot, and if drawn further away from the surface the upper part of the tube is filled with a peculiar glow or light abounding in Stoke's rays.

The experiments with the vacuum tube, and especially Gassot's cascade, are, as might be expected, very beautiful. When a coal-gas vacuum tube of considerable diameter, and conveying the full discharge from the secondary coil, is supported over a powerful electro-magnet axially, the discharge is condensed and heat is produced.

If placed equatorially, the heat increases greatly, and when the discharge is condensed and impinges upon the sides of the glass tube, it becomes too hot to touch, and if the experiment was continued too long the tube would crack.

The enormous quantity of electricity of high tension which the coil evolves, when connected with a battery of 40 cells, is shown by the rapidity with which it will charge a Leyden battery.

Under favorable circumstances, three contacts with the mercurial break will charge 40 square feet of glass.

On one occasion a series of twelve large Leyden jars arranged in cascade were discharged; the noise was great; and each time the spark (which was very condensed and brilliant) struck the metallic disk, the latter emitted a ringing sound, as if it had received a sharp blow from a small hammer.

The discharges were made from a point to a metallic disk; and when the former was positive the dense spark measured from 18½ to 18¾ inches, and fell to 8½ inches when the metallic plate was positive and the point negative.

Variations of the Leyden-jar experiments were tried by connecting the coil worked by a quantity battery of 25+25 cells with six Leyden jars arranged in cascade, and the spark obtained measured 8½ inches.

The same six jars connected with the coil, when the fifty cells were arranged continuously for intensity, gave a spark of 12 inches of very great density and brilliancy.

APPARATUS FOR THE PRODUCTION OF OZONE WITH ELECTRICITY OF HIGH TENSION.

BY PROF. ARTHUR W. WRIGHT.

Experiment has shown, that in the production of ozone by electricity, the maximum amount of oxygen is ozonised by the silent or glow discharge. In using the Holtz's electro-machine, the form of the apparatus usually employed must be varied to give good results.

When the poles of the machine itself are separated to a sufficient distance, the electricity passes between them, either in the form of a diffuse brush, spanning the whole interval, or with a very minute brush upon the negative pole, and a glow upon the positive, the intermediate space not being visibly luminous. This is the so-called dark, or silent discharge. When this occurs, the strong odor shows that a considerable amount of the atmospheric oxygen is converted into ozone.

If this discharge is made to take place in an enclosed space through which air or oxygen can be driven, the ozonising effect of the electricity is heightened and can be utilised. The apparatus which I have employed, and which has afforded very satisfactory results, consists of a straight glass tube about twenty centimetres long and having an internal diameter of 2·5 centimetres, the two ends being stopped with corks covered on the inner side with a thin coating of cement to protect them from the action of the ozone. Through the axis of each cork is inserted a glass tube of about 5 m.m. calibre and 7 centimetres in length, having a branch tube inserted perpendicularly at the middle, and long enough to permit a rubber tube to be slipped upon it. The outer ends of the tubes themselves are closely stopped with corks, through which are passed straight, thick copper wires carrying suitable terminals at their inner ends, and bent into a ring at the others. They are fitted so as to make tight joints, but to allow of motion in order to vary the distance between their ends. One of these wires carries a small ball; the other terminates in a disc with rounded edge, set perpendicularly to the axis of the tube, and so large as to leave an annular space of some two or three millimetres breadth around it. The gas is admitted through one of the branch tubes and escapes from the other, after having passed through the whole length of the tube.

In using the apparatus, the wires must be connected with the poles of the machine in such a manner that the disc becomes the negative terminal, as this arrangement gives the greatest degree of expansion and diffuseness to the current. On turning the machine and adjusting the ball and disc to a proper distance, a nebulous aigrette surrounds the latter, quite filling the interval between it and the wall of the tube, while the part of the tube between the disc and the ball is crowded with innumerable hazy streams converging upon the positive pole, or simply causing the latter to be covered with a faint glow. A current of air or oxygen sent into the tube must pass through this, and ozone is very rapidly produced, and in great quantity. The condensers are of course not used with the machine when this apparatus is employed.

NEW TELEGRAPH JOURNAL.

The new Society of Telegraph Engineers, in England, have commenced the publication of a journal, in which the progress of telegraphy as a science and as an art will be duly recorded. The first number contains a paper on "Automatic Telegraphs," by Mr. R. S. Culley, who thinks that, without the automatic apparatus, it would be impossible to supply the information required by newspapers all over the kingdom. "From the central station in London as many as 400,000 words are transmitted in a single night, and through five or six stations simultaneously, whereby it happens that the quantity of matter telegraphed is equal to a thousand columns of the London *Times*. All this is accomplished while one-half of the world are asleep. The rate of transmission varies: To Aberdeen, it is 60 words a minute; to Sunderland, 90; while to Manchester Liverpool, and Cardiff, it is 120. The messages are punched in strips or ribbons of paper, and these can be multiplied to any extent when pressure of newspaper work requires. The punching of the strips is greatly facilitated by the use of a pneumatic apparatus, in which the levers are struck by pistons actuated by compressed air. Three keys, like those of a pianoforte, open the valves, and the touch is so light that three or four ribbons can be perforated at the rate of forty words a minute, by a female clerk."

It would appear from the foregoing that our English telegraphers have not yet acquired the art of sending messages in the quickest and most economical manner, and they have something yet to learn. The aggregate number of words transmitted at the central office of the Western Union Telegraph Company, in this city, exceed that of the London central station, but no "punched strip" or automatic machines are employed in the New York office. Experience shows that the interposition of the punched strip, the punching machine, and the girl to do the punching, are an unnecessary complication in the sending of a telegraph message. First class operators can send messages more economically and quickly by the usual instruments than is possible by the above "automatic" plan. The rates of speed mentioned above, we believe, are equaled, if not exceeded, at the Western Union Telegraph office here.—*Scientific American.*

SOMETHING FOR NOTHING.

The terrific *expose* of the affairs of the Great Western Telegraph Company, published in our Sunday issue, in the crushing shape of a Supreme Court decision by Judge Lawrence, will cause much sensation in this community from the prominence of, what the Court does not hesitate to pronounce, the swindle. It deserves to secure wide publicity, if publication of any fact whatever will serve to bring the warning needed. There is one class always to be found in such affairs who never will be warned. Even the blow that wipes them out of existence to-day will have no effect to deter some similar adventurer to-morrow from entering upon a new scheme of "*Something for Nothing*," a penniless game of pitch with gulled stockholders, in which the last have not the least chance of winning. This class of men are beyond reform or rebuke. But the warning should come to the honest citizens who really put money into such schemes. It should plead them to look a little more closely at the workings of the machine. Men of prudence and scrupulous tact, who hold every bank-note up to the light to detect a counterfeit, who will not buy an acre of land without a careful challenge of flaws of title, who bring their butcher and baker and other tradesmen to strict account in their daily transactions, are constantly investing their money in these specious stock schemes, where the outlay is thenceforth unwatched, and the whole enterprise left to the hands of a manager accountable to no one. It would be interesting to go through this community, and learn, privately, from each of our present generation of business men, how much they have lost in stock schemes in the past ten years, and to review the glowing phantasms that have cost them so much. We fear, however, that, even were this whole story told, it would but slightly deter the formation of a precisely similar list in the next ten years. It is so charming, this "*Something for Nothing*," that it will be done over and over again. Only change the names in Judge Lawrence's decision, and his ringing utterances would apply to very many exploded stock schemes here, save, perhaps, in the success in *finesse* of the chief party in this particular instance.

Another branch of the warning rebukes the too common error of citizens of high standing, large business, and irreproachable integrity in too easily lending their names and credit to designing conspirators, who could make but very little or no headway without them. This is all that Judge Lawrence attaches to the name and reputation of David A. Gage, in the case of the Great Western Telegraph Company. It would be difficult to persuade our community to believe that he shared in this confusion deliberately undertaken for the sake of plunder, and our citizens are well prepared for his complete exoneration in this decision of Judge Lawrence. His too easy kindness has been the fault of other prominent citizens before him, and yet a few experiences made public of this kind should make every man of business cautious in allowing his high reputation to be loaned out like an overcoat to cover poverty or plunder.—*Chicago Tribune.*

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COMPARATIVE STATEMENT OF THE TELEGRAPHIC SYSTEM OF SWITZERLAND FOR 1870 AND 1871.

I.—LINES.

	1870.	1871.
Length of lines in miles	3,219	3,301
Length of wire in miles	6,871	7,270

II.—OFFICES.

		1870.	1871.
Number of Offices.	Open for home and international service	546	623
	Total	546	623
Number of Offices.	Government offices	493	554
	Railroad and private companies	53	69
	Total	546	623
Number of Offices.	With permanent service		5
	" full day service		36
	" limited "		582
	Total	546	623

III.—APPARATUSES.

		1870.	1871.
No. of apparatuses in service.	Morse's system	739	831
	Hughes' system	10	15
	Total	749	846

IV.—PERSONNEL.

	1870.	1871.
Upper employees, and the central administrations	15	15
Number of office employees	284	350
Subaltern personnel	593	680
Total	892	1,045

V.—MESSAGES.

		1870.	1871.
Interior Service.—Messages sent		1,132,029	1,399,214
International Service.	No. of messages sent abroad	387,652	490,395
	" " received from abroad		
	No. of messages passing in transit from one frontier to the other	109,554	134,385
	Total	1,629,235	2,023,994

VI.—RECEIPTS.

	1870.	1871.
Product of home correspondence	$251,433	$277,163
Product of international correspondence		
Sundry receipts	13,931	19,215
Total	$265,363	$296,378

VII.—EXPENSES.

		1870.	1871.
Extraordinary Budget.—Construction		$24,600	$59,998
Ordinary Budget	Personnel	137,951	159,370
	Expenses of operation and repairs of the lines and offices	50,579	54,660
	Total	$213,130	$274,028

GENERAL INFORMATION.

	1870.	1871.
Population of the State, according to census	2,510,494	2,670,345

There are 107 miles of line and 1,054 miles of wire in Switzerland, belonging to railroad and private companies.

COMPARATIVE STATEMENT OF THE TELEGRAPHIC SYSTEM IN NORTH GERMANY FOR 1870 AND 1871.

I.—LINES.

	1870.	1871.
Length of lines in miles	13,063	13,542
Length of wire in miles	43,649	45,586

II.—OFFICES.

		1870.	1871.
Number of Offices.	Open for home and international service	2,405	2,615
	Total	2,405	2,615
Number of Offices.	Government offices	1,078	1,130
	Of railroad or private companies	1,327	1,485
	Total	2,405	2,615
Number of Offices.	With permanent service	26	25
	" full day service	1,558	1,744
	" limited "	821	846
	Total	2,405	2,615

III.—APPARATUSES.

		1870.	1871.		
Number of apparatuses in service.	Morse's system	2,462	2,644	1870	63 Hughes' system.
					4 Other ditto.
	Other systems	67	71	1871	65 Hughes' system.
					6 Other ditto.
	Total	2,529	2,715		

IV.—PERSONNEL.

	1870.	1871.
Upper employees, and of the central administration	4,338	4,596
Number of office employees		
Subaltern personnel		

V.—MESSAGES.

		1870.	1871.
Interior Service.	Paid messages sent	4,333,902	4,876,146
	Free messages	398,017	337,691
	Total	4,731,919	5,213,837
International Service.	No. of messages sent abroad	938,419	1,152,061
	" " rec'd from abroad	1,061,916	1,246,062
	" " passing in transit from one frontier to the other	357,222	448,053
	Total	2,377,557	2,846,176
No. of service messages		20,494	32,671
Total of number of messages		7,129,970	8,092,684

VI.—RECEIPTS.

	1870.	1871.
Product of home correspondence	$834,094	$903,113
" international	678,251	814,504
Sundry receipts	15,693	38,688
Total	$1,528,038	$1,756,305

VII.—EXPENSES.

		1870.	1871.
Extraordinary Budget.—Expenses of establishing the system		$33,810	$62,908
Ordinary Budget.	Personnel	1,087,952	1,109,856
	Expenses of operation and repairs of the lines and offices	519,112	520,912
	Total	$1,640,874	$1,693,676

GENERAL INFORMATION.

	1870.	1871.
Population of the State according to census (latest 1867)	29,906,025	29,906,025
Surface of the State in square miles	30,14	130,141

FOREIGN TELEGRAPHIC ITEMS

THE TELEGRAPH TREATY BETWEEN GERMANY AND AUSTRO-HUNGARY.

The telegraph treaty between Germany and Austria comes into operation on the 1st of January next, remaining in force for an indefinite period, but it may be dissolved at any time by either party after twelve months' notice of such intention shall have been given. The following are the principal stipulations: in the mutual traffic between any of the telegraph stations in the Austro-Hungarian Monarchy and those of any part of the German Empire the charge for a single rate of twenty words is fixed at one Austrian florin or 20 groschens, whilst telegrams from one frontier station to another on the opposite side pay only half of the above charge. For this purpose the territory on both sides of the boundary line is divided into squares, in such a manner that every degree of latitude is divided into five, and each degree of longitude into three equal parts, and at the points where these lines cross are drawn meridians and parallels, by which fifteen squares are formed; and telegrams from any station to another in the same square are charged at the reduced rate. With regard to messages to more distant countries and only passing through the territory of either of the high contracting parties, the charges settled, or which may at any future time be settled in international treaties, are to be in force; but a special exception is made for telegrams between the Austrian dominions and Holland, passing through Germany, such telegrams to be subject only to the charge of 80 kreutzers or 12 groschens. On the other hand, Austria is to have the right to charge on such messages a terminal tax of 40 kreutzers or 8 groschens, by which, including the terminal tax agreed to by special convention with the Netherlands, the total expense of such a telegram comes to 1fl. 20 kreutzers, or 24 groschens. The money paid for messages between Germany and Austro-Hungary belongs to the government of the country where it is raised, but the rates paid for messages in transit must be accounted for according to the stipulations of the International Treaty; though in all messages to and from the Netherlands the charge is to be made without reference to the number of words contained in each telegram, but simply by the number of messages, at the average rate of 60 kreutzers, or 12 groschens. With regard to the terminal charges for telegraphic correspondence between the Austrian monarchy and the kingdom of the Netherlands, the accounts will be made up and balanced by the respective administrations of the telegraphic departments of those states. Till the charges stipulated in the International Treaty for the territory of the Telegraph Union are superseded by special rates for Austro-Hungary and the Empire of Germany, the provisions of the International Treaty concluded at Baden-Baden on October 25, 1868, remain in force as binding on all parties concerned.

THE Trans-Caucasus Provinces being only connected with the telegraph system of Russia in Europe by the single route of Tiflis and Stavropol, and, moreover, the communication being frequently interrupted, orders have been given by the Russian Government to lay down a second line of telegraph to those distant parts through Astrachan and Kisliar.

POST OFFICE TELEGRAPHS.—Statement showing the total number of messages forwarded from Postal Telegraph Stations in the United Kingdom during the week ended the 14th September, 1872, and during the corresponding week of 1871. Week ended September 14, 1872, total number of messages, 327,202; week ended Ssptember 16, 1871, total number of messages, 266,946; increase in the week of 1872 on that of 1871, 60,256.

POST OFFICE TELEGRAPHS.—Statement showing the total number of messages forwarded from Postal Telegraph Stations in the United Kingdom during the week ended the 21st September, 1872, and during the corresponding week of 1871. Week ended September 21, 1872; total number of messages, 321,478; week ended September 23, 1871, total number of messages, 256,456; increase in the week of 1872 on that of 1871, 65,022.

THE Government of Brazil has granted to Baron Mana a concession for a telegraph cable between Brazil and the Portuguese coast.

WHEATSTONE'S PATENT MAGNETIC COUNTER.—This instrument has been devised for the purpose of counting and registering the periodical motions of any machine, whether rotary or oscillating. It may be applied either near or at any distance from the machine whose motions are to be registered. It is less cumbrous than mechanical registers, and cannot be tampered with by persons in charge of the machine.

No Voltaic battery is employed, the electric currents being produced by a small piece of iron attached to the moving part of the machine, working before the poles of a magnet; it therefore requires no more attention than an ordinary piece of mechanism.

Among the purposes to which this register has been applied are the following:

To count the number of impressions produced by any printing machine.

To count the number of revolutions of a screw or paddle shaft of a steamship.

To count the number of visitors who enter a theatre or any public place.

By means of these instruments, also, the rate of working of any number of machines may be seen and compared by the overseer in any distant apartment, without the necessity of visiting the machines themselves.

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CORRESPONDENCE.

A GOOD SUGGESTION.

To the Editor of the Journal of the Telegraph:

Would it not facilitate business, if superintendents—especially railroad superintendents of telegraph—would REQUIRE all managers to give notice twice a month that they *have copied* changes in tariff from JOURNAL into tariff books? An operator taking a new office would not then start a message to a point at which the office had been closed six months, or check for other lines after an office had "a square." He would also know whether there was an office at Jonestown, or any other point, without asking all his neighbors. It would be a good time to commence with the new books.

To the Editor of the Journal of the Telegraph:

A party telegraphed through my office the other day, and requested me to make a duplicate of his message, and insert at bottom of message that "This is a correct copy of telegram sent by me Oct. ——, 1872," and for me to sign my name as operator. Answer me in your next issue if I must comply with such a request. BRANCH OFFICE.

Rule 92 reads as follows: "*All Managers and other employés are strictly prohibited from furnishing copies of original messages, or from certifying to the correctness of any message or any copy thereof, whether sent or received.*"

An operator down South, sends the following:—

"The greatest annoyance we experience in these parts is the figure "9," used upon every occasion and for a thousand trifles. I begin to look upon the figure "9" as a great fraud, and an imposition upon an innocent calling. If these "young bucks" down here call an office on some way line half a dozen times without being answered, they think they are imposed upon, and immediately come to the main wire and by singing out "dash two dots and a dash," stop press, signals, cables, or anything else and say, "answer us on No —." I try to keep still when they do that, but sometimes I let out on 'em unknowingly. They interrupt and delay important business by saying "9," and then say something which, if said the next day, would answer the same purpose to themselves and the Company. For the sake of suffering humanity tell us and the balance of the ignorant craft, the literal meaning of "9," and if you can in any way aid in stopping the abuse of the signal, you will confer a favor upon the craft."

Our indignant and inquiring correspondent is informed that the signal "9" means "give way for testing wires." If the signal is improperly used it is his duty to inform the Superintendent of the fact, and he will see that the abuse is corrected.

SALEM makes the following inquiry: If we receive a message from Boston, collect, and are obliged to forward it to another city, how do we check?

Answer.—If you receive a collect message you deliver it to the person addressed, collect the tolls upon it and charge yourself with the amount. If the party then desires it to be forwarded to another point, treat it as you would any message offered for transmission.

W. H.—You apparently had no discretion in the matter. It was your duty to deliver the message. If any person was at fault it was the one who forwarded it.

C. A. W.—Your proposed modification of the Callaud battery is substantially a return to the Daniells battery. We do not find any practical difficulty arising from the cause you mention. The Callaud battery can be moved without causing a mixture of the sulphate of copper with the sulphate of zinc; but supposing you could not do so, we do not see that it would be of any material disadvantage, since there is no necessity for moving them with much frequency. If the zinc is carefully removed there need be no disturbance of the solutions.

G. F. P.—We think the best course in such a case would be to send the message back for explanation.

ELECTRICITY AND LIFE, IN THE LIGHT OF RECENT RESEARCHES.

M. Papillion contributes to the *Revue des Deux Mondes*, a paper on this subject, from which we cull the following facts:—

The controversy between Galvani and Volta is well known. Science has proved, on one hand, that there is an electricity proper to animals, and, on the other, that electricity produced from an external source has an influence on animals.

The best evidence of animal electricity is met with in certain fishes—the torpedo, the gymnotus, the silurus, the ray, &c. The electric fluid is subject to the animal's will, and is similar to machine electricity in its effects. It gives shocks and sparks when of sufficient tension. The source consists of a series of small discs of a particular substance, separated from each other by partitions of laminated tissue, and with fine nerves distributed over their surface. It is generally situated in the region of the head, but is sometimes near the tail.

All animals are electrical, however. An electricity of the nerves and muscles (independent of their characteristic action) has been proved by Nobili, Matteucci, and Du Bois Raymond. If a frog's muscle be prepared, and touched at two different points, by the two ends of a nerve filament of the animal, it contracts under influence of a current. If a muscle, taken from an animal recently killed, be cut across the fibres, and the wires of a sensitive galvanoscope be connected, one to the natural surface the other to the cut surface, the passage of a current is indicated. A stronger current may be got by superposing several sections in form of a pile; the positive pole in which is the natural surface of one of the terminal sections; the negative pole the sectional surface of the other.

Currents are produced in other parts of the system—e.g., between the external and internal parts of the skin, in the blood, in the secretory organs. M. Becquerel has demonstrated the fact of electro-capillary action. Two different solutions, conductors of electricity, separated from each other by a membrane or a capillary space, constitute an electro-chemical circuit, and in the animal system there are numerous couples of such a character. The arterial blood and the venous blood form a couple, the electromotive force of which is equal to 0·57, that of a nitric acid couple being 100. This field, little investigated as yet, is likely to furnish valuable aid in interpretation of physiological phenomena. Plants also develope electricity. M. Becquerel has shown the existence of currents in fruits, stems, branches, and leaves. He took the stem of a young poplar, connected a platinum wire with the pith, and another with the bark, and both of these wires with a galvanoscope, which then indicated a current. M. Buff has proved the existence of currents from the root towards the leaves.

The fact of animal and plant electricity being therefore established, let us next see what are the effects, on living organisms of electricity from without.

The atmosphere contains a varying amount of positive electricity; the earth is always charged with negative electricity. It is doubtful how the electricity is developed; some physicists think it arises from vegetation and evaporation. M. Becquerel considers the sun the chief source of atmospheric electricity; which it emits, as it does light. However caused, it is only when accumulated, that it produces marked effects on life. Persons struck by lightning are variously affected. Sometimes they are struck rigid on the spot, sitting or standing; sometimes they are thrown to a distance. The lightning at times destroys the clothes, sparing the body; at other times the reverse happens. In the latter case the heart is often rent, and the bones are broken, while at other times the organs remain entire. Sometimes a softening and flaccidity is produced in the members, at other times there is contraction and rigidity. The body often decomposes rapidly, and often resists decomposition for a long time. Where death has not been caused, various sorts of maladies often appear, which may be temporary, or may be irremediable. Not to mention burns, eruptions on the skin, loss of hair, &c., the person sometimes becomes paralyzed, or deaf, or dumb, or blind, or imbecile. In short, electricity affects all the functions of the nervous system.

The action of electric fishes is often formidable. Humboldt, on one occasion, having put both his feet on a gymnotus, received a shock so violent that his limbs ached for the rest of the day. The streams containing such fishes become unfordable for mules or horses. Mules have been known to die from the discharges. To catch the fish, the Indians drive wild horses into the stream; these the fish attack, and, after their discharge, are found in a weakened state and easily harpooned. The natives use the gymnotus in treatment of paralysis. Faraday compared the shock of a gymnotus which he examined, to a batterie of 15 jars. On touching with the hand a live torpedo, a shock is felt, which is strong in proportion to the surface of contact. Electricity from an artificial source—a machine or an induction apparatus—affects the animal tissues variously. Dutrochet, in his researches on Endosmose (a kind of action which takes place extensively in animals and plants), put a tube closed at the lower part by a membrane, and containing water mixed with gum, in a vessel of pure water. The surface of the gummed water gradually rose, owing to the entrance of pure water across the membrane. Some of the gummed water also passed into the pure. It was proved, however, that in such cases, the current from the less dense to the more dense of the two liquids was more rapid than the opposite current. Dutrochet further observed that if the positive pole of a pile was placed in the pure water, and the negative in the gummed water, the endosmotic action was increased. MM. Onimus and Legros have found that by reversing the position of the poles, the surface of the liquid in the tube descends, instead of rising. Thus electricity reverses the ordinary laws of endosmose.

It variously affects also other physico-chemical actions in the system. It decomposes salts, and coagulates albuminoid matters of the blood in the tissues, just as in the vessels of a laboratory. The nutritive processes are affected by it. Continuous ascending currents accelerate the motions connected with assimilation. Animals electrified under certain conditions produce an increased quantity of urine and carbonic acid, indicating greater energy in the vital functions. Young animals subjected to electric currents grow larger and more rapidly than in ordinary circumstances.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory and Province on the Continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, OCTOBER 15, 1872.

FREE BUSINESS OF THE WESTERN UNION TELEGRAPH COMPANY.

The rules of the Company provide that official and private messages sent free by the employés of the Company must be limited to matters of an urgent nature, and that the mail must be used in all cases where it will subserve the purpose desired. These rules, however, do not seem to be properly observed. During the past year the amount of social free business done by the employés of the company amounted to over $70,000. This item, however, is insignificant in amount when compared to that covered by the service messages transmitted by the employés. The eminently wise precautionary rule which requires the limitation of official messages to matters of an urgent nature seems to be almost wholly disregarded by all classes of employés. The pressure upon the wires produced by the great quantity of this class of messages proves not unfrequently a source of great embarrassment and sometimes of delay to the revenue producing business.

A case in point, and one which suggested these remarks, occurred recently upon one of the busiest and most important circuits in the country. The business of the circuit was unusually large and was rapidly accumulating, when a lengthy message, or rather a letter, regarding a check error amounting to fifty cents, was sent over the wire. The value of the time occupied by the transmission of this message was worth to the Company many times the amount involved in the error. It is of the utmost importance that all check errors should be promptly corrected, but it is not right that the valuable time of important circuits should be occupied for this purpose. The message referred to would have accomplished its desired object just as effectually had it been sent by mail or had it been detained until the business of the day had been finished.

With reference to the personal messages of employés there is no desire on the part of the Company to restrict the transmission of those of an urgent character. It is only desired that the employés shall restrict themselves to such matters as cannot await the delivery by mail. A great many personal and social messages transmitted for the employés of the Company seem to be wholly unnecessary, and such as would not be sent if payment of tolls were exacted.

If each employé of the Company will reflect that he constitutes but one out of an army of ten thousand in the service, he will perceive how the comparatively insignificant amount of his own free service becomes swollen into an enormous volume when multiplied by the whole number of persons employed. Let each employé therefore of every grade, from the highest to the lowest, consider, when he writes a message, whether the purpose cannot be accomplished as well if sent by mail as if sent over the wires, and if so, then by all means use the mail. If the mail will not serve his purpose, then let him consider whether the message cannot be sent at night; and if so let him write it upon a red blank and have it transmitted at a time when the wires are not occupied with important full-rate business. If the matter which he wishes to send is of such pressing importance as to require the best facilities of the Company at the most important hours of the day, then let him write it upon a full-rate blank in as condensed a form as he would write it if he was to pay in cash the regular full-rate for its transmission.

If every employé of the Company would reflect that a free message costs just as much to send as a paid message, and that the average cost of every message sent by the Company is two-thirds of the tolls charged, we are quite sure that the annual working expenses would be materially reduced by the diminution in personal and service messages.

The two classes of messages sent by the officers or employés of the Company may be designated by the word *Immediate*, written upon those requiring prompt transmission and by the word *Red* upon those which can await the convenience of the service.

PLEASANTLY REMEMBERED.—A very pleasant surprise was made upon Mr. E. W. Bradford and his wife at their residence on Austin street, Worcester, Mass., Thursday evening. A large number of the many friends Mr. Bradford has made as manager of the Western Union Telegraph office and in social life, gathered, with gifts and congratulations, to celebrate the tenth anniversary of his wedding day. During the pleasure of the evening Mr. Albert P. Hopson, in behalf of the party, presented Mr. and Mrs. Bradford with a costly silver set, with some fine table linen, upon which its several elegant pieces may do future service.

ATTENTION is called to the advertisement of Mr. Eugene F. Phillips, of Providence, R. I., manufacturer of telegraph office wire of all descriptions, which appears in this issue. We are assured that the wire furnished by Mr. Phillips is of a superior quality, and that his terms are very reasonable.

THE Captain-General of Porto Rico has dismissed Mr. Morris, the cable electrician, from the service, because he is also editor of the *Boletin*, an organ of the ultras, and because he wrote against the radicals and criticised the Captain-General.

RETIREMENT OF MR. W. H. ABEL, AUDITOR WESTERN UNION TELEGRAPH CO.

In consequence of continued ill health, Mr. W. H. Abel, Auditor of the Western Union Telegraph Company, has retired from the active supervision of his department.

This course has been rendered necessary from the fact that his attendant physicians advise him in the strongest manner to pass at least a year in the South of Europe and in Africa. He accordingly sails in the steamer Adriaticon Saturday, 19th inst., for Liverpool and from thence by earliest conveyance to Egypt.

Mr. Abel has, for a number of years past, been suffering from a bronchial complaint, which latterly has assumed an acute form; and the respite from his engrossing labors, which, heretofore, he has felt unable to take, is now absolutely forced upon him.

We trust that Mr. Abel will be so benefitted by this trip, that he will be able upon his return, to again assume, with his characteristic vigor and energy, the duties of his position.

RESIGNATION OF MR. TUNIS J. POWELL.—APPOINTMENT OF HIS SUCCESSOR.

Mr. Tunis J. Powell, of the auditors' department, who has been in charge of the Atlantic and the Cuba Cable accounts since the commencement of cable business, resigned his position on the first of the present month.

In the performance of his duties Mr. Powell has given unqualified satisfaction to the company. He leaves with the regret of all who have been immediately associated with him, and with the best wishes of all connected with the service.

He sails with his friend, Mr. Abel, on the 19th, on a pleasure excursion to Europe and to such other parts of the world as occasion and circumstance may induce.

Mr. Powell is succeeded by Mr. George W. Roberts, lately of the bookkeeping department, who, from his antecedents, will doubtless fill the position with honor to himself and profit to the company.

APPOINTMENT OF MR. LEONARD COX AS CASHIER OF NEW YORK OFFICE.

It gives us much pleasure to announce the appointment of Mr. Leonard Cox as Cashier of the New York Office of the Western Union Telegraph Company. The position is one of the most important in the service, requiring just the skill and ability which Mr. Cox is able to bring to it.

Prior to 1865 Mr. Cox was Cashier of the Charleston and Columbia, S. C., offices. Since then he has been Secretary successively to Gen. Marshall Lefferts, President J. H. Wade, and to Vice-Presidents McAlpine, Green, Walker, and Mumford.

Politeness and courtesy are indispensible for an easy path through life, and they are no less necessary for a successful and proper performance of business duties. Prompt and courteous attention to customers is enjoined. Nothing is more annoying to a customer than indolent and apparently indifferent attention. Civility costs nothing and always pleases.

TO OUR correspondent at New London, Ohio, we would say: The columns of the JOURNAL is hardly the place for a communication of the character he favors us with. He had better address the party he complains of direct. If he then fails to receive satisfaction, and there was fraud in the transaction, his best course would be to request the intervention of the Superintendent of the delinquent.

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THE ANNUAL MEETING OF THE STOCKHOLDERS OF THE WESTERN UNION TELEGRAPH COMPANY.

ELECTION OF OFFICERS.

The annual meeting of the stockholders of the Western Union Telegraph Company was held on Wednesday, October 9th, at the office of the Company, 145 Broadway, the President, Mr. William Orton, in the chair. The first business transacted was the election of a Board of Directors for the ensuing year. Messrs. George B. Prescott, J. D. Reid, and William Arnoux acted as inspectors of election, and the following gentlemen were unanimously re-elected as Directors for 1872–73; William Orton, James H. Banker, Horace F. Clark, Alonzo B. Cornell, Harrison Durkee, Augustus W. Greenleaf, Edwin D. Morgan, O. H. Palmer, Augustus Schell, John Stewart, E. B. Wesley, Hugh Allan, Nathan A. Baldwin, William D. Bishop, Ezra Cornell, William E. Dodge, Sheppard Gandy, Norvin Green, John A. Griswold, Wilson G. Hunt, George Jones, C. Livingston, E. S. Sanford, Hiram Sibley, Z. G. Simmons, Moses Taylor, Daniel Torrance, George Walker, Stillman Witt. The number of votes cast was 273,116, representing stock amounting to $27,-311,600.

The election being over, William Orton, President of the Company, submitted an able and exhaustive report, exhibiting in detail the operations of the Company for the last fiscal year ending June 30, 1872, from which the following items of interest are extracted: On the 30th of June, 1872, the Company operated 62,032 miles of line with 137,199 miles of wire. All this is operated through 5,237 offices. The increase during the year past was 6,000 miles of line, 16,039 miles of wire, and 631 offices. To perform the labor required for such vast operations the Company has in its employ 8,347 operators, who last year transmitted 12,444,499 messages, being an increase of 1,788,422 over the year preceeding. The gross receipts for the year were $8,457,095 77, the expenses $5,666,863 16, leaving a net profit of $2,-790,232 61, which is an increase over the last year of $819,646 92 in the gross receipts, $562,075 97 in the expenses, and $257,570 95 in the net profit. During the past year the company has introduced one of the most important inventions for the transmission of messages which has been made since the telegraph first went into operation. This is the duplex telegraph invented by J. B. Stearns, by means of which messages can be transmitted in opposite directions on a single wire at the same time. It has come into very general use, and has afforded vastly increased facilities for telegraphing. The present Western Union system dates from the consolidation of the United States, the Southwestern, and the American Companies in 1866, and the net profits during that six years ending June 30, 1872, amount to $17,116,694 23. Of this sum $4,856,879 34 was distributed to the stockholders in dividends, and $1,-898,401 98 disbursed for interest on the Company's bonds. The balance—$10,361,412 91 was expended in the construction of new lines, the erection of additional wires, and the purchase of telegraph property.

The report of the President was accepted, and on motion a suitable number of copies were ordered printed in pamphlet form for distribution among the stockholders. The meeting then adjourned.

On Thursday, October 10, the Board of Directors elected the following gentlemen officers for the ensuing year:

President—William Orton; Vice-Presidents—A. B. Cornell, O. H. Palmer, Augustus Schell, George H. Mumford.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York.
October 15, 1872.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular.

GENERAL INFORMATION.

Offices in ILLINOIS and WISCONSIN are hereby instructed to use STATE RATE of FOUR dollars to IDAHO and MONTANA TERRITORIES; and offices in IOWA and MISSOURI to use SQUARE RATE to offices in IDAHO, MONTANA, NEW MEXICO, and SQUARE rate *when given* to offices in UTAH.

Messages addressed to Union Stock Yards, Ill., should not be checked to Chicago. The office at the Stock Yards should be checked direct on all messages addressed to it.

Macon Station, Ala., closed.
Evansville, Ala., "
Marianna, Ark., re-opened.
Yosemite Valley, Cal, closed.
Kirkwood, Del, "
Blackshear, Ga, "
Iuka, Ill, P. O. A., Middletown, Ill.
Lyons, Ind., closed.
Palestine, P. O. A., Sugar Creek, Hancock Co, Ind.
Reams' Stock Yards, Ind. Terr, closed.
Albin, Ia., changed to New Albin, Ia.
Bucksport, Me. should read.....30 3 10 Bangor, Me.
Castine, " " " .....30 3 10 " "
Warrington, " " " .....Harrington, Me.

Messages may be taken for Topsham, Me, to be delivered from Brunswick, Me. 25 cents for delivery should be collected.

Pioche City, Nev., now W. Union office.
Bethlehem, N. H, closed.
Crawford House, N. H, closed.
Glen House, " "
Jackson, " "
Profile House, " "
Twin Mountain House, N. H., closed.
Mt. Washington, N. H., closed.
Mt. Washington Depot, N. H., closed.
White Mountain House, N. H., closed.
Waumbeck House, Jefferson, N. H., closed.
Raritan, N. J., check direct.
Cornwall, N. Y., closed.
Lake George, N. Y., closed.
Lebanon Springs, N.Y., closed.
Linwood, N. C., "
Alexandria Roads, O., P. O. A, New Alexandria, Jefferson Co., O.
Black Hand, O., " Toboso P. O., Muskinghum Co., O.
Bloomfield, O., " Fair Play, O.
Corwin, O., " Waynesville, O.
Dodson, O., " Bachman, O.
New Market, O., " Scio, Harrison Co., O.
Pendleton, O., " So. Pendleton, Hamilton Co., O.
Seville, O., " Pike Station P. O., O.
Tippecanoe, O., " Tippecanoe City, Miami Co., O.
Macksburg, O., " Regnier's Mill P. O., Washington Co., O.
Hughes' Station, O., " Horrs, O.
Sharon, O., " Sharonville, O.
170 Liberty, Guernsey Co., O., P. O. A., Kimbolton, Guernsey Co., O.
Phillipsburg, O., P. O. A., Stone Creek, Tuscarawas Co., O.
Manayunk, Pa., now W. Union. Check direct. Tariff 10 cents more than Philadelphia.
Spring Brook, Luzerne Co., Pa., changed to Moosic, Pa.
Stemton Pa., is in Northampton Co., not Carbon Co., as given in Tariff Book.
Watch Hill, R. I., closed.
Clarendon Springs, Vt., closed.
Alleghany Springs, Va., closed.
Dublin, Va., re-opened.
Healing Springs, Va., closed.
Hot Springs, Va., closed,
Montgomery White Sulphur Springs, Va., closed.
Rockbridge, Alum Springs, Va., closed.
Rockbridge Baths, Va., closed.
Sweet Chalybeate Springs, Va., closed.
Warm Springs, Va., closed.
Old Sweet Springs, W. Va., closed.

NEW OFFICES.

267 Cowle's Sta., Ala.
286 Elmore Sta., Ala.
412 Argenta, Ark.
381 Madison, Ark.
Redding, Cal.
329 Vienna, Ill.
271 Clymers, Ind.
455 Clarinda, Iowa.
417 Derby, "
376 Elkport "
417 Humeston, Iowa.
388 Viele, "
530 Dodge City, Kan.
403 Girard, La.
14 Auburn, Me. Check Lewiston, Me.
21 East Saugus, Mass.
148 Arenac, Mich.
127 Duncan City, Mich.
190 Brownsville, Minn.
Tariff to square 190 is 10 cents more than to square 366.
342 Lake, Miss.
465 Humboldt, Neb.
502 Table Rock "
474 Tecumseh, "
* Wolfboro, N. H.....25 2 17 Great Falls, N. H.
* Wolfboro Junction, N.H25 2 17 " "
41 West Bergen, N. J.
83 Scipio, N. Y.
* Clinton Corners, N. Y..25 2 46 Poughkeepsie, N. Y.
* Pleasant Valley, N. Y..25 2 46 Poughkeepsie, N. Y.
* Portville, N. Y..... 55 4 120 Buffalo, N. Y.; 20 2 120 Olean, N. Y.
* Stanfordville, N. Y... .25 2 46 Poughkeepsie, N. Y.
* Stissing, N. Y.....25 2 46 Poughkeepsie, N. Y.
116 Abbottsburg, N. C.
116 Laurinburg, N. C.
144 Lilesville, N. C.
116 Lumberton, N. C.
98 No. West, N. C.
144 Rockingham, N. C.
202 Thornport, O, P. O. A, Thornville, Licking Co, O.
212 Woodstock, O.
Germantown Junction, Pa. Tariff 10 cents more than Philadelphia.
* Keating's Summit, Mc-Kean Co, Pa.... 65 4 120 Buffalo, N. Y.; 30 2 120 Olean, N. Y.
66 Lansford, Pa, Check Summit Hill, Carbon Co, Pa.
Lawrenceburg, Pa., Check to and at same rate as Parker's Landing, Pa.
480 Niches, Tex.
511 Rice Station, Tex.
English Camp, W. T.
Hatt's Camp, W. T.

CUBA CABLE BUSINESS.

The Cable to Aspinwall is now open for business. Tariff, five dollars, gold, for ten words; fifty cents for each additional word, in addition to the present rate to Jamaica, via Cuba Cable.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Oct. 5, 1872.

On and after Monday, the 21st inst., Mobile, Ala., will be added to the list of money order offices, *specially authorized*. I. C. HENDRICKSON, Transfer Agent. G. H. MUMFORD, Vice-President.

EXECUTIVE OFFICE,
NEW YORK, Oct. 15, 1872.

On and after October 21st, *Dallas* and *Palestine*, *Texas*, will be added to the list of money order offices in D. P. Shepherd's District and Hallville, Texas, to list in W. A. L'Hommedieu's District.

G. H. MUMFORD, Vice-President.

THE following are the awards of premiums to electrical and telegraphic instruments and apparatus at the Cincinnati Industrial Exposition:

Best telegraphic instrument for private use, silver medal to Merchants' Manufacturing and Construction Company, New York City.

Greatest improvements in telegraphy, silver medal to STEARN'S Duplex, entered by Western Union Telegraph Company.

Best burglar alarm telegraph, bronze medal to HOLME'S Burglar Alarm.

Best electric gas lighter, silver medal, Electric Gas Lighting Company, New York City.

Best system railroad signals, silver medal, F. L. Pope & Co., New York City.

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THE SERVICE.

WESTERN UNION TELEGRAPH CO.,

AUGUST, 1872.

TRANSFERS.

Name.	*From what Office.*	*To what Office.*
Josie A. Cooke	Cooper Union, N.Y. City.	145 Broadway, N.Y. City.
Josie G. Curtiss	117 Worth St., N.Y. City.	Roslyn, L. I.
Henrietta Johnson	Brooklyn, E. D.	117 Worth St., N.Y. City.
W. G. Magowan	145 B'dway, N. Y.	Grand Central Hotel, N. Y. City.
Helen A. Price	" "	117 Worth St, N.Y. City.
Herbert Smith	" "	Canal St., N.Y.City.
R. A. Stevens	Sturtevant House, N. Y.	Fulton Market, N. Y. City.
C. Van Benschoten	Hunter's Point, L I.	Washington Market N. Y. City.
G. W. Waldron	Allerton's, West N. Y. City.	145 broadway, N.Y. City.
L. W. Hoyt	Halifax, N. S.	Sackville, N. B.
E. T. Barberie	St. John, N. B.	Plaister Cove, C. B.
W. S. Libby	Auburn, Me.	Newburyport, Mass
Isa. Crocher	N. Attleboro, Mass.	Chelsea, "
A. S. Bedwin	Boston, "	Duxbury, "
E. J. Fullum	New York, N. Y.	" "
H. W. Barbour	Groton, Conn.	Bridgeport, Conn.
A. G. Coffin	Hyde Park, Mass.	Fall River, Mass.
Miss E. F. McKenzie.	Framingham, Mass.	Boston, "
A. L. Boardman	Summit, R. I.	Plainfield, Conn.
W. M. Talcot	Westfield, Mass.	Boston, Mass.
W. A. Brower	New York, N. Y.	Lake Mahopac, N.Y
J. H. Tophff	Syracuse, N. Y.	St. Louis, Mo.
J. Cummings	" "	New York, N. Y.
E. C. Adams	New Brunswick, N. J.	Cape May, N. J.
Minor C. Gross	Philadelphia, Pa.	Atlanta City, N. J.
John A. Hartman	" "	" "
J. A. Thomas	Stroudsburg, "	Del. Water Gap, N.J.
J. F. Wilde	Washington, D. C.	Philadelphia, Pa.
J. T. Anderson	Wilkesbarre, Pa.	Elizabeth, N J.
H. W. Page	Bordentown. N. J.	New Brunswick, N. J.
T. H. C. Reed	Darlington, Md.	Hopewell, Md.
W. B. Scattergood	Mount Holly, N. J.	Camden, N. J.
Lawrence Wheeler	Cairo, Ill.	Des Moines, Ia.
M. M. Cullough	Milwaukee, Wis.	Chicago, Ill.
David Kennedy	Kansas City, Mo.	Topeka, Ks.
L. L. Smith	Pittsburgh, Pa	Titusville, Pa.
L. A. Langworthy	Titusville, "	Pleasantville, Pa.
T. M. Jackson	London, Tenn.	Knoxville, Tenn.
R. W. A. Horner	Knoxville, Va.	Lynchburg, Va.
G. W. Westervelt	Galveston, Tex	Corpus Cristi, Tex.
S. H. Whitaker	Indianola, "	Galveston, "
A. D. Cunningham	Speakeville, Tex.	Brownsville, "
L. B. McFarlane	Nashville, Tenn.	New Orleans, La.

TELEGRAPHERS' INSURANCE ASSOCIATION.

The acknowledgment of receipt on any assessment is to be understood as an acknowledgment for all previous assessments.

ASSESSMENTS 32 AND 33

2	5	15	16	22	23	28	29	30	37	42
46	51	52	53	56	59	60	61	64	72	86
88	90	103	113	114	117	122	129	131	133	134
141	142	144	145	148	153	157	166	172	176	177
183	185	186	187	188	192	199	201	202	208	210
211	217	218	220	231	235	240	244	245	254	254½
255	257	269	276	278	279	281	282	283	285	286
289	291	297	301	312	316	319	341	342	344	346
349	351	352	354	361	371	378	380	383	385	394
406	411	416	420	426	430	433	434	438	454	459
463	464	476	508	509	510	520	524	526	533	536
546	547	548	549	553	556	557	560	562	564	565
569	574	577	579	586	592	622	626	646	655	662
668	664	665	667	669	672	678	679	680	685	695
697	702	703	705	706	714	721	722	729	731	734
750	751	756	758	769	775	781	782	783	785	786
789	791	797	802	803	804	812	821	825	830	831
832	836	838	841	842	848	858	859	870	874	875
883	901	916	917	918	922	923	926	931	932	939
940	942	943	944	952	966	976	978	995	1000	1005
1008	1009	1011	1014	1016	1023	1024	1040	1046	1047	1054
1055	1063	1071	1073	1074	1075	1076	1081	1084	1088	1090
1103	1126	1141	1143	1144	1145	1146	1147	1149	1151	1155
1156	1157	1158	1159	1160	1162	1164	1165	1167	1173	1174
1175	1178	1183	1185	1195	1198	1199	1200	1207	1209	1210
1213	1217	1220	1224	1225	1233	1237	1238	1239	1241	1245
1251	1252	1254	1255	1259	1260	1261	1274	1275	1276	1281
1282	1283	1284	1285	1286	1292	1294	1295	1298	1300	1304
1306	1307	1308	1309	1311	1312	1313	1314	1315	1317	1318
1320	1321	1322	1327	1329	1332	1345	1353	1354	1355	1357
1358	1359	1363	1364	1365	1367	1368	1371	1372	1376	1381
1395	1398	1400	1402	1403	1405	1409	1410	1412	1413	1419
1429	1430	1431	1432	1437	1438	1440	1444	1446	1448	1451
1453	1454	1455	1456	1461	1462	1464	1465	1466	1467	1468
1469	1470	1471	1474	1476	1479	1481	1482	1484	1487	1488
1489	1493	1495	1496	1497	1500	1501	1503	1504	1506	1507
1508	1515	1516	1517	1518	1522	1524	1527	1532	1542	1550
1554	1557	1558	1562	1566	1568	1570	1571	1579	1580	1583
1587	1589	1591	1596	1603	1615	1616	1623	1626	1629	1630
1634	1636	1637	1644							

ASSESSMENT NO. 32.

21	277	298	323	333	353	372	379	431	467	552
575	587	615	766	850	856	915	941	1001	1006	1019
1041	1043	1057	1058	1066	1092	1108	1117	1154	1182	1206
1266	1267	1423	1477	1502	1521	1528	1545	1551	1553	1593
1594										

BORN.

TRUE.—At Tuckerton, N. J., October 10, 1872, to W. F. True, Manager W. U. T. office, a daughter.

MARRIED.

CASSIDY—GRAY.—At Barry, Ill., September 18, in the Baptist Church, by the Rev. H. L. Stetson, James P. Cassidy, of the Superintendent's office of the Western Union Telegraph Co., at St. Louis, Mo., to Miss Josephine Gray, of Barry, Ill.

COLVIG—DYER.—At Canyonville, Oregon, September 23, 1872, George W. Colvig, Manager W. U. Tel. office, Canyonville, to Miss Mary Dyer, of same place.

CROCKETT—VAIL.—On Thursday Oct. 3, 1872. at the residence of A. S. McCormick, R. W. Crockett, Agent and Operator T. W. and W. Ry., Rockfield, Ind., to Miss Delphine Vail, of Delphi.

DIED.

BERRY.—At New Orleans, La., October 6, of diptheria, Daniel Trant Berry, of Racine, Wis., after a residence at that place, in the employ of the Western Union Company, of one month.

Mr. Berry was widely known among telegraphers, having been many years in the profession. He was an honorable man, one of the most genial of companions, and a steadfast friend.

HIGDON.—At Kit Karson, Col., Wednesday, September 20, suddenly, of heart disease, Mr. George E. Higdon, formerly of Indiana, an operator of the Kansas Pacific Railway Telegraph.

His remains were sent East to his friends.

OLIVER.—At Hugo, Col., September 30, burned to death, accidentally, Mr. G. D. Oliver, formerly an operator on the Denver and Rio Grande R. R. Telegraph.

RANDALL.—At Ann Arbor, Mich., September 13, after four months' illness of inflammation of the bowels, Fred. A. Randall, aged twenty-one years and six months.

OBITUARY.

FRED. A. RANDALL.

The deceased was a member of the Telegraphers' Mutual Life Insurance Association. He learned the telegraphic art at Ann Arbor, Michigan, six years ago, in the office of the Western Union Telegraph Company. He was first employed on the telegraph lines of the Michigan Central Railroad as an extra operator, which position he filled to the satisfaction of his employers for three years. He then entered the Western Union Telegraph Office at Jackson, Michigan, where he remained one year, when he was offered and accepted a situation with the same Company under the management of Mr. Doolittle, at Lafayette, Indiana.

After serving in that office one year, he came to Chicago, Ill., and accepted a situation with the same Company on the night force of the Chicago office. His worth was soon discovered, as he was an operator of more than ordinary ability, not only as a manipulator of the key, but as an electrician, and he was promoted to a position on the day force, where he worked some of the best wires in the office. In the nine months that he was in actual service here, he made friends of all with whom he was brought in contact.

As a companion and brother operator he was all that could be desired, his conversation showing at all times his genial, warm-hearted nature; no unkind or insinuating remark was ever heard from his lips. As a son he was the personification of dutiful affections; as a brother his devotion was unbounded, his love of home and domestic society causing his early death to be the more keenly felt. May we who survive him cherish his many virtues and profit by his manly example.

OFFICERS OF THE WESTERN UNION TELEGRAPH COMPANY.

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Alonzo B. Cornell,
O. H. Palmer,
Augustus Schell,
George H. Mumford,
Vice Presidents.

George H. Mumford, *Secretary.* — R. H. Rochester, *Treasurer.*

George B. Prescott, *Electrician.* — W. H. Abel, *Auditor.*

Anson Stager, *Gen'l Sup't Central Division, Chicago, Ill.*
Thomas T. Eckert, *Gen'l Sup't Eastern Division, New York.*
John Van Horne, *Gen'l Sup't Southern Division, Louisville, Ky.*
James Gamble, *Gen'l Sup't Pacific Division, San Francisco, Cal.*

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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 23. NEW YORK, NOVEMBER 1, 1872. WHOLE NO. 120.

WHEATSTONE AUTOMATIC TELEGRAPH.

BY R. S. CULLY.

The advantages of machine over hand labor are as apparent in telegraphy as in any other mechanical act, even without regarding speed, for signals mechanically sent will always be better formed, and more legible, than those sent by the key. But we are able to show, from experience, that besides assuring better signals, a greatly enhanced speed can be attained by the automatic system.

My intention, in this paper, is to speak only of those automatic systems of which I have personal experimental knowledge, and I am in consequence obliged to pass over more than one of great merit; among them, that bearing the name of our worthy President.

The system of Alexander Bain was the first that was actually worked in this country, and the method of signalling by means of perforated paper, which is, I think, employed in all systems, was introduced by him. It was tried between London and Birmingham, or Birmingham and Gloucester, in about the year 1850, and I myself used it between Manchester and Liverpool in 1852. It failed, partly because the insulation of the wire was too variable to allow of rapid signalling except in fine weather, but mainly because we had no good punching apparatus. I revived it some three years since between London and Southampton, attaining a rate of 60 words per minute, and should have continued the trial had it not been that such an arrangement had been concluded with Sir Charles Wheatestone as rendered it unnecessary to improve a method radically inferior.

Bain perforated the paper ribbon in such a manner that the punctures represented the Morse signals themselves, but, as it were, magnified. A wire brush rested on the ribbon, and made contact with a metal wheel through the holes in the paper. This plan has several objections; dust or fibres of the paper are apt to interfere with the contacts, and what is more important, the edges of the perforations act upon the brush in a manner which prevents it touching the metal wheel over a considerable portion of the space allowed for contact. Better results were obtained by lengthening the perforations in the paper, and running the machine proportionately faster. The system employed by the Postal Telegraph Department is Wheatstone's, in which the contacts are made between levers and studs, the paper being used only to regulate the movement of these contact pieces. This arrangement gives much more uniform and trustworthy contacts than can be obtained between a brush or spring and a revolving wheel, and affords great facilities for the production of the compensating currents, which are required at high speeds. The principle of the apparatus is that the armature of the electro-magnet, which causes the printing disc to touch the paper, shall not have a tendency to leave the paper when the marking current ceases, but shall remain always in the same position in which it is left by the last current. The machine is arranged to send a series of reversals or alternate + and — currents at definite and regular intervals, and the function of the perforated ribbon is to decide whether these currents of either sign shall or shall not pass out to the line. An ebonite rocking beam (R, *Fig.* 1), moved by wheel-work, carries three pins, that on the left hand is connected to "line," that on the right hand to "earth;" the centre pin is insulated, and serves to connect the curved lever (B, *Fig.* 1) with one or other of the battery levers (Z, C), according to the positon of the rocking beam. Under the beam lie the two levers (A,B). These levers are pivoted independently, but are in electrical connection through the spiral springs (H, H1) attached to them, and through the frame of the instrument. On the ends of these levers (A,B) are pivoted the vertical needles (V,V1). The one (V) regulates production of the marking, the other (V1) that of the reverse or spacing current. These levers are not *fixed* to any of the moving parts of the apparatus, but are firmly pressed upwards by the spiral springs (H, H1, Fig. 1) so as to follow the movements of the rocking beam, and remain in contact with the pins inserted into this beam so long as their upward movements are unchecked. The needles attached to these levers determine whether line contact should be made or broken at the moment battery-contact is made. Their rise alternately until they touch the paper ribbon; if there be a hole opposite their points, they pass through it and the contact is undisturbed; but should there be no hole, their motion and that

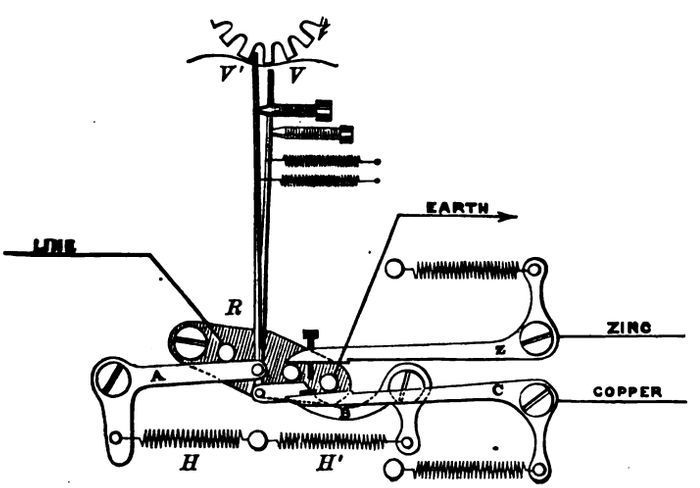


Fig. 1.

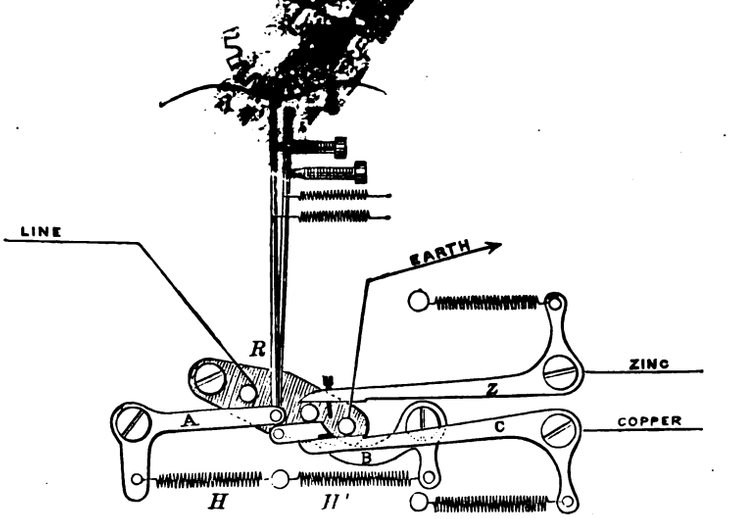


Fig. 2.

of the lever is stopped, and the pin on the rocking beam continuing to rise, contact is broken between it and the lever.

Fig. 1, shows the apparatus in a position for sending a negative current. The levers Z and C are the poles of the battery. The lower lever C touches the right hand pin on the rocking beam, and as this pin is in connection with the earth, the copper pole is in connection with the earth also. The upper lever Z, which is in connection with the zinc pole of the battery, rests on the centre pin of the beam, and is in connection with the line through the lever B, the spiral springs H, H1, and the frame of the instrument, the lever A, and the left hand pin; and thus a *negative* current has been sent to line.

Fig. 2 shows the position where the current is broken. The rising of the lever A is prevented by the paper, the vertical needle V1, attached to it, not meeting with a hole in the ribbon. Here the contact between the lever A andthe left hand pin is broken, and no current passes on to the line.

When the speed of transmission is increased beyond a rate which varies with the length of the circuit, embarrassment arises which is partly due to in-

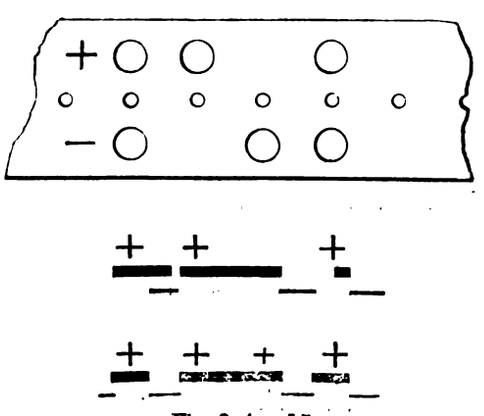
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duction when the potential of the line wire varies with the interval between the currents, and partly to what may be called the "inertia" of the electro magnet of the receiving apparatus, the time occupied by the magnetising and demagnetising the iron, varying also with the interval between the currents, and probably even in a comparatively short suspended wire, not more than 70 words per minute could be attained under Bain's method, where the currents are sent precisely in the same manner as by an ordinary single current key.

With reversals, speed is increased, but is still considerably lower than the maximum to be attained on a given line. It is well known that a succession of equal currents of opposite signs, at equal intervals, will give perfectly distinct *dots* at a very much higher speed than the *dots* and *dashes* of an alphabet can be produced.

Wheatstone's apparatus produces the Morse signs by currents of equal duration; or, in other words, by a succession of *dots;* but as the intervals between the currents are necessarily unequal the alphabet is more slowly produced than a series of equidistant *dots*. The speed of a succession of letters (an alphabet) depends also on the distance between the letters, the *greater* the interval the *slower* the speed, because an additional element of variation in the electrical condition of the wire and the magnetism of the receiver is thus introduced. Speed is generally limited more by defects in the formation of the letter than by the loss of dots, or running together of marks, and the defects are greatest where there is the greatest irregularity in the intervals between currents, as for instances, in F — — — — R — — — It is necessary, then, to apply a system of compensating currents to maintain as great a uniformity as possible in the condition of the wire and electro-magnet.

This was effected in the first instance by bridging over the break in the circuit which occurs when the pin is stopped by the paper, by resistance coils, so that a weak current was sent in the interval of break, the strength of which currents was regulated by varying the resistance. This system was further improved upon by an alteration of the transmitter by which the compensation was more accurately applied, and it is upon this principle the apparatus is at present constructed, although experiments in a different direction are in progress which may bring about a further improvement in the system.



Figs. 3, 4 *and* 5.

Fig. 3 is intended to represent a piece of the perforated ribbon, the perforations which regulate the contact making portion of the transmitting apparatus are represented by the larger circles, while the centre row of holes is represented by the smaller circles; by this row of holes the paper is carried forward in the transmitter.

The slip is perforated for the letter R of the Morse alphabet; this letter has been selected as being one which is always much deformed, and which shows the effect of a dot preceding and following a dash. The upper row of holes is that which allows a positive or marking current to be sent when the vertical pin V (Figs. 1 and 2) of the transmitter passes through one of them. The lower row of holes allows a negative current to be sent in the same way when the vertical pin V1 (Figs. 1 and 2) of the transmitter rises through one of them.

Fig. 4 represents the letter R of the Morse alphabet, as received at high speed on a line where the original system of intermittent currents is used. It will be seen that in the case of the dot before the dash, a +, then a —, and finally a second +, that is two positive, and one negative current are sent to form the dot and to commence the dash; that is, twice as much positive as negative current, and the dot is consequently much elongated, and has a tendency to run into the dash. In the case in which the dot follows the dash, it will be seen that the case is exactly the reverse of the former, and for the finish of the dash a — current is sent followed by a +, and finally by a second — current, the last two to form the dot; that is two — and one + current are sent, so that in this case the line is charged negatively in excess; consequently the space between the dash and dot is considerably increased, and the dot much shortened or lost altogether.

Fig. 5 shows the letter R as received where compensating currents are used, and is perfect with respect to the length of the marks and the spaces between them. The compensating currents are represented by the smaller signs. It will be seen, that before the commencement of the dot the line is charged negatively, instead of being left clear, as in the original system, and prevents the elongation of the dot before the dash, as already explained.

In the case of the dot following a dash, it will be seen that a positive compensating current is sent before the terminating current for the dash, so that the line is not too much negatively charged, as where no compensating currents are used, and the elongation of the space separating the dash from the dot, as well as the diminished size of the dot itself, is prevented. (Fig. 5.)

The principle of compensation is, I am aware, not new; but I think no practical way of applying it has before been proposed.

In a circuit composed partly of over-ground wires, and partly of buried or submarine wires (and all our circuits contain a considerable proportion of buried wire), the position of the underground work or cable will effect the speed at which the two stations can receive from each other. If the buried portion or portions be symmetrically placed with respect to the two stations, as when the land lines at each end of a cable are of equal length and resistance, the two stations will be able to read each other equally well; but if the land lines on one side be much longer than at the other, the rate at which the station at the end of the shorter land line will be able to receive, will be *less* than that at which the station situated at the end of the longer land line can receive from the other. This difference of speed is sometimes very considerable, and the difference is the greater as the lengths and resistances of the land lines on each side of the cable are the more different.

The London and Amsterdam circuit is composed of, first a suspended wire of 130 miles, then a cable of 120; lastly, on the Dutch side, a suspended wire of 20 miles.

Here it was found that the relative speeds of signalling were as 9 to 6, the higher speed being Amsterdam to London. The rate to Amsterdam was increased by decreasing the resistance of the batteries; and still further by the insertion of a high resistance (as much even as 5,000 ohms) at Amsterdam (in the receiving circuit only) to delay the discharge of the cable.

But in the case of the London Dublin circuit, where the land lines were 266 and 10 miles respectively, and the cable 66, in all 342 miles, the addition of resistance at Dublin in the receiving circuit has no appreciable effect, because the length of land line on this side is too great to permit the cable to be sufficiently charged. Here the speeds are 40 and 80 respectively. In fact, the speed to Cork from London is 38 words, or nearly as high as London to Dublin, though the distance is greater, the English line being 298, cable 62, and Irish line 124 miles, or in all 484 miles. Here the resistance per mile of the wire is less, the wire being of a larger guage; but the more central position of the cable has a considerable effect. Moreover, the resistance of the English line is equal to only 149 miles of the Dublin line, so that the potential of the English end of this cable can be raised above the corresponding end of the Holyhead cable. The apparatus, as at present made, can be arranged either to send what are technically called "permanent" currents, or to represent an ordinary double current key, or, 2ndly, to send short initial and final currents separated by an interval of insulation, called the "intermittent" system, or, 3rdly, a strong initial and final current, each followed by weaker currents of the same sign, the strength of which can be regulated with great exactness by the amount of resistance which is placed in the battery circuit. This is called the "compensated" system.

To practice the system of working is this: If the weather be dry, and the insulation high, the "intermittent," or perhaps the "compensated" system with a very high resistance, giving a very weak compensation current, is used. When there is contact, the "permanent" system or the "compensated" with a low resistance. This is to keep out the stray current on the same principle as the double current key. In the case of contact it is sometimes found serviceable to add resistance at the receiving end of the circuit, increasing the battery power; this is simply to lessen the tendency to receive the leakages from the adjoining wires.

It has been already shown how resistance is used at the receiving end of the circuit where there are submarine cables. It is used on ordinary land lines for a similar purpose, that of balancing the position of buried wires. It is found that on *east* and *west* wires the speed is decreased about noon. The cause is not clear, bnt it probably is due to the ordinapy diurnal variation in earth currents. There may also be something due to the increased resistance of the wires from the increased temperature. In all cases speed is increased by inserting a shunted condenser at the receiving end.

There is also a very noticeable amount of embarrassment due apparently to the magnetic inertia of the electro-magnet of the receiver.

On short circuits it begins to be felt with "permanent" currents at 70 words; with "intermittent" at an intermediate speed varying with the strength and duration of the compensation current. To overcome this defect we have been for some time engaged in experiments for the purpose of dispensing with the electro-magnet, adopting the well-known principles of a light moveable helix and a large fixed magnet, or a helix within a helix. It may be interesting to state the actual speed attained in practice with the Wheatstone apparatus.

To Aberdeen --- ---	60 words per minute.	
" Sunderland --- ---	90 "	"
" Manchester ---	120 "	"
" Liverpool ---		
" Cardiff -- ---		

In some cases as many as four intermediate stations are introduced on the circuits devoted to the press, on which 1,000 words are sent simultaneously to each station in 20 minutes with regularity. For news-work the ribbons are punched in duplicate, or even in triplicate, and the same ribbon is used for several sets of stations in succession. Indeed, were it not for the automatic system, it would be impossible for the Post Office to convey the large amount of matter handed in by the Press Associations.

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F. C. WEBB ON AN ELECTRICAL EXPERIMENT WITH AN INSULATED ROOM.

The object of the author's experiments was to show that the ordinary theory of the action of the Electrical Machine is incorrect. Some years ago the author endeavoured to prove by reasoning that the ordinary explanations given of the discharge of a charged conductor by communication with the ground was erroneous; and suggested an experiment with an insulated room as a means of proving the fallacy of these ordinary explanations of discharge, &c. The extracted results are best given in the author's own words.

It is generally stated in books on electricity, that when an electrical machine has its rubber to earth, on the action of the machine the prime conductor becomes charged positively and the equal quantity of negative electricity which is generated is lost in the earth, and that when the prime conductor is then placed in contact with the earth, its discharge is merely the consequence of its sharing the electricity with the earth, the proportion remaining on the conductor being, in virtue of the almost infinite size of the earth as compared with the conductor, almost infinite small, and consequently quite inappreciable. When, therefore, the ordinary experiment of charging the prime conductor is performed in an insulated room, according to the theories which I deny, the negative electricity being unable to share itself with the earth, some differences in the effects produced should be attained. The negative electricity, for instance, if it tends to flow to the earth, should influence an electrometer placed in contact, and exterior to the room. Again, if the room is connected to the earth during the charging of the prime conductor and is afterwards insulated, the prime conductor, if touched to the room, ought not to be discharged, since it can only share its electricity with the room instead of with the almost indefinitely large surface of the earth. Now, I argue, that when electricity is produced, at any rate by artificial means, the negative and positive are not only always produced in equal quantities, but remain each as much in abeyance as the other, and that complete discharge always consists in the recombination of equal quantities of opposite electricity. Thus when a conductor is charged, say, positively from a plate-machine having the rubber connected to the earth, the negative electricity has no tendency to flow to and distribute itself equally over the earth, but distributes itself principally on the nearest conducting surfaces to the positively charged surface; and when the surface to which the negative pole is attached entirely bounds the dielectric which separates it from the positively charged surface, the negative electricity is entirely distributed on that surface, none flowing to any other part of the earth. When these are joined by a conductor, discharge occurs through the recombination of the exactly equal quantities of electricity previously produced.

For carrying out the experiments a room was constructed about 8 feet by 9 and about 8 feet high. The floor was of wood, and the sides of wooden framework, covered with calico, and with pieces of tinfoil pasted about it, to make it a good conductor. It had a door and two windows of wire gauze. A small table was placed in it, and a frictional electrical machine was placed on this. The room was suspended by four double parts of half-inch-round gutta-percha band to a wooden frame, the floor being about four feet from the ground. The gutta-percha was covered with paraffin, and the whole room was tested for insulation with a delicate astatic Thomson reflecting-galvanometer, and gave no perceptible loss. A Peltier electrometer was placed on the ground outside, and a wire from the brass knob of this was connected to the gauze of the window. The table was connected with the tinfoil that was pasted about the surfaces of the room, so that when the rubber or prime conductor was connected to the table it was in connection with the sides of the room. Thus arranged, the machine acted to all appearance exactly the same as in an uninsulated room. When the rubber was connected to the table, on turning the glass disc, the prime conductor was charged so as to give off sparks the same as when the room was uninsulated; and the conductor was completely discharged when touched to the insulated room. Not the slightest effect was produced on the electrometer, even when sparks were flashing from the prime conductor to the wire gauze of the windows to which the wire from the electrometer was attached. Connecting the room to the earth made no difference. A sphere about a foot in diameter was then charged, when the room was insulated, and then handed out by an insulating handle, when the electrometer immediately diverged to about 50°, showing that the outer surface of the room had become negative. On taking the sphere back into the room, the elcctrometer fell to Zero. It is impossible to reconcile these results with the explanation of the action that takes place in charging and discharging as giving and republished in most works. Take, for instance, the following from Noad's "Student Text Book:"—"Thus, in order to get any developement of electricity, there must be either with the rubber or with the prime conductor, electrical communication with the earth, as the great natural reservoir of electricity." According to the views I have advocated, the accumulation on the prime conductor depends on the resistance of what I have termed the inductive circuit, which, in the case of charging the prime conductor, with the rubber connected to surrounding objects, consists simply of the resistance of the dielectric separating the prime conductor from the surrounding objects, and is therefore the same whether the room is connected to earth or not.

Dr. Ferguson, in his "Electricity," seems to have a tendency to discard the older explanations; but at times his explanations appear to be incomplete, thus he says:—

"We have hitherto taken no notice of the—E, that, for instance, is said to be lost in the ground when glass is charged positively. Now it may be lost, and the—E induced by the glass on surrounding conductors may be new—E induced by it. But it is also possible nay, even probable, that this—E is none other than the—E said to be lost. If this be the case, the ground acts as much on the glass as the glass on the ground; and the action is precisely the same as in a galvanic circuit, when the polarisation proceeds in opposite ways in two opposite directions, the action of the one strengthening the action of the other." Dr. Ferguson adds, "However, it makes no practical difference, and it is simpler to suppose the insulated body to be the one centre of force." With this last paragraph I cannot agree, as it will be found that, by considering problems of electrostatics by means of the theory of inductive circuits, many can be solved which cannot be explained by an allusion to the earth as a common reservoir. The experiment with the insulated room is only one of them. I maintain that no electricity is ever lost in the ground or drawn from the ground as a reservoir. All electricity generated, if we consider it as a quantity, is produced in equal quantities, and can only be neutralized by an equal quantity of electricity of the opposite name. Thus, when the sphere in the insulated room experiment was charged positively from the prime conductor, an equal quantity of negative went to the room. When the sphere was taken out of the room, this negative went to the outside of the room at the same time that the external conductors to the room became polarised, so that there remained on external objects a charge of negative opposing the positive on the sphere, and a charge of positive opposing the negative on the external surface of the room. By connecting the sphere to the earth, the sphere's charge and its oppposing charge on surrounding objects neutralise each other, leaving the room negative to a positive charge in the earth, which, when touched together, neutralise each other. Or if the sphere is touched to the room, the positive of the sphere neutralises the negative on the room, the negative and positive charges in surrounding objects at the same time recombining also. Or when the sphere was taken back into the room, the negative returned to the inside of the room, the positive and negative which were induced on external conductors by the sphere and room when the sphere was external to the room recombining.

Circumstances prevented Mr. Webb from carrying out a more complete series of experiments, but the experiments made seem sufficient to show the fallacy of the generally accepted theory of the Electrical Machine.

ORIGIN OF ELECTRO-MAGNETISM.

The experiments of Volta resulted in the pile named after him. Two heterogeneous metals, such as zinc and copper, are immersed in a glass of water, to which a few drops of sulphuric acid have been added; both metals we connect by a long wire, and then we find the wire possessed of a new force which can transmit a motion through the distance of a hundred miles and over. For a long time, the Voltaic pile had been the subject of unsuccessful experiments for the purpose of finding its relation to the magnet, to which, on account of its poles, it bears a certain resemblance. One day, Oersted, at a lecture in Copenhagen in 1819, noticed that a magnetic needle on his table was disturbed by a communicating wire that happened to pass over it. He removed the wire, and the needle resumed its polar direction; he then replaced the wire, and the needle again turned aside.

Electro-magnetism was thus discovered. At once he recognized the immense bearing of the phenomenon, repeated the experiment in presence of the magistrate, a notary public and other witnesses, and made a Latin affidavit; this places his name, for all time to come, among the benefactors of the human race. The advantage of his invention is enjoyed by all of us who daily read telegrams from distant parts of the world, as if this rapid transmission of news were a matter of course. The wonder has become a fact of daily occurrence; it rises with us and accompanies us through the day.

SOLAR ECLIPSES AND MAGNETIC VARIATIONS.—In reference to the question of a possible connection between solar eclipses and terrestrial magnetic variations, as deduced from the observations of December, 1870, M. Broun states that a comparison of observations made at Trevandrum (near the central line of the eclipse of December, 1871, on that occasion), with other observations, indicates that ordinary slight magnetic disturbances, passing from one region to another, do not appear to undergo any change of character, either before, during or after an eclipse. And hence he concludes that solar eclipses have not the influence in producing terrestrial magnetic variations that Diamilla Müller and others had assigned to them.

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FOREIGN TELEGRAPHIC ITEMS

THE TELEGRAPH CABLE BETWEEN BRAZIL AND PORTUGAL.

As we stated last week, Baron de Itauna, the late Minister of Public Works, a few days before his death, accepted the proposal of Baron de Mana to lay a telegragh cable between Brazil and Europe, on a concession for twenty years. It would appear that Baron de Mana engages to have the cable at work at the end of 1874, and that it will run from some point of the Province of Pernambuco, *via* Madeira and St. Vincent, to Portugal, he having come to an understanding with the English companies holding the Portugeuse concessions for cables between England and Portugal, the arrangements regarding which understanding were approved by the Minister of Agriculture. The decree is dated the 16th August. At the expiration of the twenty years the concessionary will have the use of the cable or cables for twenty years more, but without monopoly. If on January 1, 1885, the number of telegrams during the two previous years should have averaged daily 300, of 20 letters each, the conces ionary may be required to lay a second cable. The charge per telegram of twenty words may not exceed 140f. from the coast of Brazil to that of Portugal, 125f. to Madeira, and 80f. to St. Vincent. If, on or after January 1, 1877, the daily average of the two preceding years should have been 150 telegrams of 20 letters, the rates must be reduced respectively to 120fr., 107fr., and 72fr. 50c. The Government will abate 20 per cent. from its rate for telegrams having to pass its lines to the cable. The concessionary may, before 1877, lay cables to the West Indies and Senegal, and may also lay cables along the coast to points authorized by the Government, should the concession of March 28, 1870, not be carried out. The Cuzco took to England Mr. Rieke, who is commissioned by the directory of the Platino-Brazilian Telegraph Company of Rio Janeiro to place the contract for laying the telegragh cable from Rio to the River Plate, the concession for which is now held by the company.—*The Railway News.*

THE manufacture of the duplicate French Atlantic and of the Great Western cables is steadily progressing; of the former about 700 miles are already coiled on board the Great Eastern, and the electrical condition of the cable is all that can be desired.

THE new General Post-office in London is approaching completion, and steps are being energetically carried out for the transfer of the head telegraph station there; wires are being laid in every direction, and a large system of pneumatic pipes laid down.

AT a meeting of the Board of the Anglo-American Telegraph Company, held October 5th, it was resolved to pay the usual interim dividend of two per cent. on the 1st of November next, for the quarter ending the 30th of September last.

THE directors of the French Atlantic Telegraph Company have declared the usual interim dividend of 2 per cent., payable on the 1st of November next, for the quarter ending September 30.

THE directors of the China Submarine Telegraph Company have declared an interim dividend of 3s. per share for the three months ending the 30th of September, 1872, and they announce that on and after the 15th inst. the rate for messages from London to China will be raised from £4 6s to £6 per twenty words, and to Japan from £5 6s. to £7.

THE Exchange Telegraph Company (Limited) have recently announced that they are now prepared to furnish the offices of subscribers with their telegrapic printing instruments, which will occupy not more than 11 inches of space, and will register the fluctuations of the stock and share markets continuously throughout the day; the system has been at work successfully in America for the last five years, and there are about 300 instruments now in operation there.

POST OFFICE TELEGRAPH.—Statement showing the total number of messages forwarded from Postal Telegraph stations in the United Kingdom during the week ending the 28th of September 1872, and during the corresponding week of 1871. Week ended September 28, 1872, total number of messages, 314,220; week ended September 30, 1871, total number of messages, 270,632; increase in the week of 1872 on that of 1871, 43,588.

The total number of messages forwarded from postal telegraph stations in the United Kingdom for the week ended October 5th, 1872, was 320,231—an increase over the corresponding week of last year of 46,932.

A MEMORANDUM from the London office of the Great Northern Telegraph Company states that the traffic receipts on the company's lines were as under, viz: China and Japan lines—August, 1872, 76,855fr., against August, 1871, 55,912fr. The Shanghai-Nagaski line was opened on the 12th August, 1871. During August, 1872, the Hong-Kong-Shanghai line was interrupted fourteen days. European lines—September, 1872, 131,972fr., against September, 1871, 98,820fr. China and Japan lines—September, 1872 98,490fr., against September, 1871, 41,750f.

THE Australian telegraph line is completed, and communication is now open with Melbourne.

A despatch from that city, dated the 21st inst., was published on the morning of the 22d in London, but it contains nothing of importance.

IN the Spanish Cortes, October 21st, 1872, Senor Pascual called attention to what he termed "the shameful condition of the telegraphic service in Spain." He knew of cases in which despatches from Madrid were forty-eight hours in reaching Paris, and thirty-six hours on the way to Barcelona. He wanted to know if the government, which had charge of the telegraphs, was unable to do better, whether the business could not be transferred to private hands.

THE director of the International Telegraph Office at Berlin has been instructed by the Italian minister to communicate to all the governments and companies represented at the Telegraph Congress held last Winter at Rome that, with the exception of Persia and Denmark, all the parties interested have ratified the convention.

SINCE the opening of the Russian telegraph to the Amoor, and its extention to the China and Japan lines, the number of messages forwarded has increased in such an unexpected and unprecedented manner that the Telegraph Department has resolved to put up another wire on the Siberian line, and the needful orders have been given for the supply of the materials, and the commencement of the work on the section between Omsk and Tomsk as soon as the weather will permit, next Spring.

THE second section of the Russian Telegraph line to Turkestan was opened on the 12th of September from Semipolatinsk to Surguipol, and is found to work admirably.

A COMPANY has been formed for the construction of a telegraphic cable from Rio de Janeiro to the River Plate. A recent report presented by the directors stated that the sea distance from Rio de Janeiro to Lobos Island, off Moletonado, at the mouth of the River Plate is 1,260 miles, and a few more miles of cable will be required from the island to the main land. The shore once reached, a land line of 90 miles will establish communications with Monte Video. Monte Video is connected with Buenos Ayres by a cable, and from the Argentine capital a message can be sent quite across South America, the Andes included, to Valparaiso on the shores of the Pacific. The capital of the Rio Janeiro and River Plate Telegraph Company has been fixed at £600,000, and the work is to be pressed forward with vigor.

THE extension of the telegraph from Grahamstown to Coromandel in New Zealand is nearly completed.

TELEGRAPHIC communication is now complete between Yeddo and Nagasaki, in Japan. Further extensions are in progress.

STATEMENT OF THE TELEGRAPHIC SYSTEM IN HOLLAND FOR 1871.

I. LINES.		
Length of lines in miles		1,939
Length of wire in miles		6,697
II. OFFICERS.		
Offices open for home and international service		261
Of which were Government offices	129	
Of railroad or private companies	132	
		261
Of these, in permanent service there were	3	
Full day service	50	
Limited service	208	
		261
III. APPARATUSES.		
Number of apparatuses in service:		
Morse System	294	
Hughes system	21	
		315
IV. PERSONNEL.		
Upper employés, and of the Central Administration	18	
Number of office employés	611	
Subaltern personnel	246	
		87
V. MESSAGES.		
Interior service, messages sent		1,180,185
International service:		
Messages sent abroad	287,885	
Received from abroad	299,365	
Passing in transit from one frontier to the other	270,912	
Total number of messages		2,038,347
VI. RECEIPTS.		
Product of home correspondence	$147.187	
Product of international correspondence	114,904	
Total receipts		$262,091
VII. EXPENSES.		
Extraordinary Budget:		
Construction of lines	$ 28,079	
Ordinary Budget:		
Expenses of operation and repairs of the lines and offices	355,502	
Total expenses		$383,581

AN official report, which has appeared in illustration of the Victorian Telegraph department for 1871, presents several features of interest. The revenue increased in 1871 to the extent of £4,000, as compared with 1870, and since a uniform shilling rate came into operation the business has been nearly doubled.

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CORRESPONDENCE.

To the Editor of The Journal of the Telegraph:

Some time since the JOURNAL said that managers are not *compelled* to write messages if asked to do so by persons who can write themselves; that they should inform all such that they are not authorized by the Company to do so. Now we wish to ask are managers *forbidden* to write telegrams for those who can write?

Often times the senders of messages write almost illegible hands, many cannot spell one word in ten correctly, others do not know where to put address or signature, and sometimes the messages are brought from out of town on slips of paper in no kind of shape to put on file. What shall we do in such cases? Rewrite the messages (a kindness to ourselves as well as the sender,) or send and file as originally written, after making all corrections possible?

Answer.—No manager is forbidden to write telegrams for any one, but any message so written should be signed by the sender. In case a manager or receiving clerk copies an illegible message for the convenience of the operator transmitting it, the original should be attached to and filed with the copy.

To the Editor of the Journal of the Telegraph:

"I notice in the JOURNAL tariff circular of Oct. 1st, 1872, the entry "368 Mounds, Ills.," no county given. There is a "Mounds" in the northern part of the State, for which this is doubtless meant. There is and has been for years, an office at Mounds, Pulaski county, Ill., the business for which is checked with Pulaski, Ills., probably in square 329, as it is between Cairo and Pulaski, as we frequently repeat business to the Pulaski County Mounds, which he claims is not for his office. A correction in the next circular would be of service to the Company and the public."

It will be observed by referring to the tariff circular that the suggestion of our correspondent has been carried out.

To the Editor of the Journal of the Telegraph:

Will you please inform me through the JOURNAL whether I ought to take a message sent "red" from starting point, after seven o'clock A. M.? Should it not have been sent the night before, or else checked full rate? Such are offered me very often.

A YOUNG REPEATER.

The receiving operator has no discretion in the matter. It is his duty to receive all messages sent to him. If he considers any of them improperly sent he should promptly report the matter to his Manager or to his Superintendent.

To the Editor of the Journal of the Telegraph:

I wish to inquire in regard to a message received for collection, and party refuses to pay charges, shall I deliver the message whether he pays or not?

Some claim that they have a right to the message, and I must collect of the party sending the message. I find no rule to apply to such cases. An early answer will oblige OPERATOR.

Answer.—Every message should be promptly delivered, whether paid or collect. If the party receiving a collect message refuses to pay the charges upon it, the fact that he refuses should be promptly reported to the sending office.

Rule 11 provides that all messages, except answers or those covered by franks, must be prepaid, unless guaranteed by responsible parties. Any office which sends a collect message, unless it is an answer, becomes liable for the tolls, and must account for them in case of a refusal to pay by the party to whom it is addressed.

No such message, therefore, should be withheld in consequence of a refusal to pay the charges.

To the Editor of the Journal of the Telegraph:

Referring to Section 3, Ex. Order No. 141, Journal, Sept. 16th, 1872, how should the additional half of the charges collected on a "Red" message, delivered the same night it is received, be accounted for?

Should the sending office be notified to check; or should it be reported as "Extra Receipts"?

Answer.—The amount so collected should be returned as extra telegraph receipts.

To the Editor of the Journal of the Telegraph:

In your issue of August 15th, 1872, I found answer to my query in regard to message received August 1st, dated San Francisco, July 31st. In your issue of Oct. 1st, I see you give me a slight hit in regard to making out my reports as soon as my light was out. This waiting until the night of the 2d, to make out reports, is very nice, provided you have your own way about it. But when the Superintendent orders your reports to be sent in on the 1st without fail, will you please tell me how I am to wait for delayed business? It would, indeed, be very nice to have a word to say once in a while, and to wait for delayed business. REGISTER.

Rule 64 provides that a monthly report of the business of each office must be made at the close of each month, and be forwarded to the District Superintendent not later than the third day of the next succeeding month.

The proper inference to be drawn from this rule is that the first and second day of the month is to be given to the Manager to make out his reports, and post in delayed business.

The book of rules is the guide for all employés alike.

Under date of Omaha, Neb., Oct. 24, we have the following interesting statement:

"Some three months ago, a man riding on the prairie west of here, was struck and instantly killed by lightning. He had upon his person a valuable watch, which was apparently not harmed, but which afterward would not run. A jeweler, on examination, found every steel part of it so strongly magnetized, that where any two steel parts of it come near together, they will not move. He brought me a small piece of the works, containing no more metal than there is in a *small* needle; yet it was so powerful a magnet as to move readily a small galvanometer needle an inch.

"I would like to enquire whether this magnetism can be driven out in any way but by heating, which I think would render the parts magnetized useless."

The parts might be demagnetized by touching them to the poles of a magnet; but the operation would be a difficult one, and would require considerable care. It would be necessary to ascertain the location of the north and south poles in each part, and when touched with a magnet, care must be taken that the contrary charge should not be greater than the charge to be overcome.

THE following, from an indignant correspondent contains a few pertinent enquiries:

"As 'C' was among the offices to which the wrong square was printed in two successive tariff books, I have had ample opportunity to discover the fact that a large number of offices have entirely neglected the important duty of posting their tariff books from the JOURNAL. On behalf of this office, as well as others which have been incorrectly entered in tariff books, and subsequently corrected through the JOURNAL, I respectfully ask whether there cannot be such a penalty attached to this culpable neglec as will make it to the *interest* of these careless parties to keep their tariffs promptly corrected from the JOURNAL. In reply to check error requests received since the distribution of the tariff supplement of September 16th, 1872, three or four have declined to give vouchers for overchecks, because 'both the old and new tariff books show in square 339 and not 329.' This shows that the writers of said replies have made no corrections in their tariffs since 1869! Ought not such men to be forced to pay for their neglect!"

The matter alluded to by our correspondent is a highly important one. All managers should promptly post in their tariff books the changes published in each issue of the JOURNAL. Negligence in this matter can no longer be tolerated.

F. H. Z. We are much interested in your valuable communication, and have no doubt that its publication would be followed by very great benefits, but we think it would be more appropriately published in a medical journal.

The great essentials to be observed by those in the employ of the Company, who are steadily engaged at the desk or table for several hours per day, are plain food, fresh air, and exercise. All stimulants of every character except that derived from the inhalation of pure air, should be avoided. Every man and woman employed in the telegraph business ought to walk at least four miles per day in the open air. If this course is pursued there will be much fewer cases of headache, coughs, colds, and consumption to be found in our ranks.

Another excellent thing for all persons, and especially for those of sedentary occupations, is a cold water bath every day. Cold water, plain food, pure air, and plenty of exercise, will ensure good health even to those whose occupations are of the most confining and sedentary character.

J. S. P. Vine-dresser is one word.

M. P. Managers pay the postage on the JOURNAL recived by them, and charge the amount in their monthly statement.

OPELIKA.—Nothing would be gained by your suggested addition to the sounder in order to prevent waste of local battery. Precisely the same result would be attained if one of the wires were detached from the binding screw in its present form, or if metalic connection was prevented between the points on the relay.

A WELL-CULTIVATED EAR.

One of the most remarkable illustrations of the power which a telegraphic operator acquires to distinguish individuals by their touch upon the instrument, has just been afforded by Mr. Hempstead, one of the operators in the Western Union Telegraph Company's office in this city. About a fortnight ago, Mike W. Sherman, formerly an expert and well-known telegraph operator here, escaped from the Middletown Insane Asylum, where he has been confined, and though thorough search was made for him, he successfully eluded the people who were on his track until Monday night. While Hempstead was at work in the office here that night, he suddenly recognized, among the clatter of a score of messages passing over the wire, a sound which he at once declared was the touch of the missing Mike. It proved to be a message from Wallingford, and an investigation showed that Mr. Hempstead was quite right in ascribing it to the insane man, who was found there yesterday, he having dropped into the office in the former place Monday night, and taken a hand at his old business.—*Hartford Post, Oct. 2.*

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory and Province on the Continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

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JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, NOVEMBER 1, 1872.

WHEATSTONE'S AUTOMATIC & STEARN'S DUPLEX TELEGRAPHS.

We reproduce in another part of our paper, a concise and exceedingly interesting description of Wheatstone's Automatic Telegraph, read by Mr. R. S. Cully, Engineer-in-Chief of the Post Office Telegraphs, before the Society of Telegraph Engineers. Professor Sir Charles Wheatstone, the inventor of the above mentioned system, stands at the head of the profession as an electrician and inventor of telegraphic apparatus. As the inventor of the Needle Telegraph, the Dial Telegraph, the Wheatstone Balance, and of the best automatic telegraph ever produced, his name will be always associated with the telegraphic progress of the age.

Wheatstone's Automatic Telegraph—unquestionably the most rapid and effective apparatus of the kind which has ever been brought out—has had the singular good fortune of falling into intelligent, appreciative and competent hands. From the first, it has been an especial favorite of the Postal Telegraph authorities. Born in the days of private telegraphy in England, it had met with little favor from the managers of private companies, and seemed likely to die in its infancy without an opportunity of developing its practical capacity. The advent of governmental rule afforded the desired opportunity. As soon as Mr. Scudamore obtained control of the English lines, he ordered a thorough trial of this system Fortunately for both, Mr. Culley, the Engineer-in-Chief of the Postal Telegraphs, is not only one of the most experienced and competent electricians and telegraphists in the world, but he is an enthusiastic admirer of Wheatstone's invention.

Thus, then, the automatic system in England possesses the best possible combination of circumstances for success. The invention of the most distinguished electrical discoverer now living; its practical developement in the hands of one of the most experienced telegraphic engineers in the world, owned by a government with unlimited means at its disposal, and operated in the most wealthy and populous commercial country in Europe, it cannot fail of producing the best results of which the automatic system is capable. What are these results? The answer to this question is perhaps best presented by the distinguished gentleman who participated in the discussion of Mr. Culley's paper at the meeting of the Society before which it was read. At that meeting the following facts were brought out.

The highest speed attained in practice with the Wheatstone apparatus was 120 words per minute, between London and Liverpool, and 38 words per minute between London and Cork.

To operate the automatic apparatus at the rate of 120 words per minute requires eight clerks at each end of the line, consisting of three punchers, one person to attend to the apparatus, and four copyists.

Mr. Culley said that it did not pay to use the automatic apparatus on short lines; it was cheaper to put up extra wires.

Mr. Preece claimed that it was more accurate than handwriting, and consequently produced more speed, because want of accuracy caused a repetition of messages, and thereby delay. On the other hand, the automatic system possessed the following disadvantages:

"The act of punching, the act of preparing the message, and the various processes it had to go through before it passed through the transmitter, involved delay, and the result was that the messages transmitted by these means invariably incurred delay; trifling when taken in the aggregate, but which could not be admitted in short circuits. The next point to be considered with this system was that of expense in regard to the number of persons employed. The average, as far as his experience went, over the numerous automatic circuits they had, was five clerks. What did that mean? It meant that, to increase the capacity of their wires to from 30 to 35 words per minute to 60 or 70 words—which was the average velocity of the automatic system—they must increase the staff from two clerks to ten. Now clerks, they knew, could not live on nothing, and that meant expense, and, as he had shown, the increased capacity of the wires was about double. This problem, therefore, arose. Taking, on the one hand, the double capacity of the wires and its increased staff, and on the other hand, the ordinary working apparatus with its small staff, how far were they justified in doubling the working by the introduction of the automatic wire, or for how short circuits were they justified in adding to the wires instead of applying that automatic apparatus. The practical solution of the problem was this, that the automatic apparatus, economically speaking, could not be applied to less distance than 200 miles. Within that distance it was better to increase the number of wires. Beyond 200 miles it was better to employ the automatic apparatus."

The distance from London to Liverpool, where a speed of 120 words per minute is attained, is 206 miles. The distance from London to Cork, where a speed of but 38 words per minute can be reached, is 482 miles, 62 of which is cable. The highest speed attained between London and Aberdeen, a distance of 515 miles, is 60 words per minute, which is the maximum speed attained in this country upon the Phelps letter printing instrument. Thus then we find that the usefulness of the automatic system, in point of speed as compared with our hand sending apparatus, lies between distances of 200 and 500 miles of aerial wire.

With the Stearns' duplex telegraph we transmit messages in opposite directions at the same time upon a single wire between New York and Chicago, a distance of 1,000 miles, at full speed; or from 70 to 80 words per minute. This apparatus requires no previous preparation of the messages, and consequently neither delay nor extra expense. It is operated by the same operators employed to work the ordinary Morse instruments, and whenever the business is insufficient to occupy a sending and a receiving operator at each end of the wire, the apparatus can be used as a single Morse instrument without change or modification. We are successfully employing this apparatus upon circuits extending between New York and Chicago, New York and Buffalo, New York and Baltimore, New York and Boston, New York and Portland, New York and Albany, Cincinnati and Pittsburgh, Cincinnati and Cleveland, Cincinnati and Chicago, Chicago and St. Louis, Sacramento and San Francisco, and Detroit and Chicago, and have the instrument now in readiness to place upon several additional circuits.

Between New York and Boston we have two sets of the duplex telegraph in operation, and during the season at the watering-places successfully employed them between New York and Long Branch and New York and Saratoga.

When these instruments are supplied to all the great centres of communication, we shall be able to double the capacity of all of our through wires at a moment's notice, and this without the necessity of employing, as in the case of the automatic system, a large and expensive auxiliary force. The great advantage of the Stearns duplex telegraph over the Wheatstone and all other kinds of automatic telegraph lies in its simplicity; in its always being ready for work; in its not requiring an auxilliary force; in its not requiring any previous preparation of messages; in its not causing any delay; in its being operated by the regular force of employés; in its being adapted alike to long or short circuits; in its ability to work through repeaters; in its cheapness; and, finally, in its thorough adaptability to the requirements of all telegraphic correspondence, viz: the instant and constant transmission of messages between any two points, near or remote.

The claim that is set up for the automatic system of less liability of mistake in transmission, is an important one, and, should it be verified in practice, would be entitled to great consideration, for accuracy is a great *desideratum;* but as the messages have to be prepared by hand, and read from the slip by the eye, and then copied by hand, we do not comprehend why there should necessarily be an increase in accuracy.

An experience of twenty years in reading by sight and by sound has produced the almost unanimous conviction in the minds of American telegraphists of the superior accuracy of the latter.

In Mr. Scudamore's report to the Postmaster-General, dated May, 1872, he gives a return of the work done by one Manchester Wheatstone circuit in each hour of the day between ten A. M., and eight P. M., on the 10th of January. The number of messages transmitted per hour range from 31 to 137; the distance from London to Manchester is 227 miles—somewhat less than that between New York and Boston—while the greatest number of messages transmitted is less than has been sent over one wire in the same time with the Stearns duplex apparatus.

We shall watch the progress of automatic telegraphy in England with interest, and should it develope any points of superiority we shall not be slow to acknowledge them. But, so far, we believe that the plan so ingeniously and successfully worked out by Mr. Stearns for increasing the capacity of the wires for the transmission of messages is vastly superior to all others.

With the issue of the Journal of November 15th a large nuuber of subscriptions will expire. It is hardly necessary to expatiate on the excellence of the paper, nor upon the low rate at which it is published. It speaks for itself. We are convinced that every person who now subscribes will continue, and will, upon receipt of this notification, duly apprise us of that fact.

BACK NUMBERS OF THE JOURNAL WANTED.

Numbers 16, 19, 20 and 22, Volume II of the Journal of the Telegraph are wanted to complete a file. Twenty-five cents a number will be paid, and the favor duly appreciated. They may be sent to this office.

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PROFESSOR TYNDALL'S FIRST LECTURE IN AMERICA.

Professor Tyndall made his debut before an American audience on the evening of October 15th, in the hall of the Lowell Institute, on Washington street, Boston. It was packed with people, and his reception was exceedingly warm and hearty.

Professor Tyndall's apparatus was arranged chiefly upon a large table, arranged as three sides of a square, in the center of which he stood while speaking. A long, narrow bridge was built out from the front of the platform over the heads of his audience, and on this was placed the auxiliary instruments with which the Professor produced his most brilliant effects, in analyzing a ray of light upon a canvas at the back of the platform.

While his two assistants were preparing the batteries and wires and electrical lamps and prisms, he gave a little discourse on the pursuit of science for the truth's sake, vindicating the investigator and claiming for his apparently aimless labors an importance equally as great as the practical work of the worldly without the scientific experimentalism of 300 years ago. He showed there could be no industrial England or industrial America to-day without such labors. Next he spoke of the importance of the work of the scientific demonstrator, and then turned to his instruments. His lectures, he said, were to be confined to the exposition of the laws of heat and light.

By the aid of a platinum wire and battery, he explained the electrical light which he uses in all his experiments. Bidding the gas glare begone, he caused a platinum wire, stretched across the table in front of him and no thicker than a horse hair, to glow with an intense brightness and then melt by electricity, which sufficed to demonstrate the principles of electrical action. Then substituting his lamp for the circle of gas jets of the hall, he proceeded by a series of rapid and beautiful experiments to analyze a ray of light. Through a tiny aperture in a bit of tinfoil, he took the single ray and showed the process of combustion and the laws of refraction. Then with a prism he resolved the ray into its component fragments, and afterwatds gave the synthesis of light, by those wonderfully brilliant and marvellously simple methods which have given him a world-wide reputation as the greatest living popular scientific demonstrator.

PROFESSOR J. H. PEPPER.

We are pleased to observe the arrival, in this city, of Professor J. H. Pepper, Director of the Royal Polytechnic Institution of London. He comes to this country on a tour of observation.

During his stay, we are to be favored with a few of those striking and marvelous scientific lectures for which he is celebrated, and which have attracted so much attention in London. The first lecture is announced for October 30th, at Steinway Hall in this city. Some of Professor Pepper's experiments with light and electricity are said to be quite astonishing, his appliances for direct illustration being very effective and original.

COMPARATIVE TESTS OF INSULATORS.

Date.	Time.	Deflection of Galvanometer. Glass.	Deflection of Galvanometer. Pond.	Remarks.
1872				
Oct. 18.....	3 — P. M.	11¼°	¼°	Fine rain 4 hours.
Oct. 25.....	4 — P. M.	17½°	1¼°	Rain 36 hours.
Oct. 26.....	11 — A. M.	26°	2° nearly	Rain 48 hours.

These tests were made through both coils of a Varley galvanometer, the first test with 65 cups, and the two last with 85 cups of battery.

ATLANTIC CABLE BUSINESS.

Note the following changes in the instructions for Atlantic Cable business:

For 8th and 9th line of Rule 2, page 248 of Tariff Boook, read: "The 'place from' must be inserted and paid for throughout in messages to points beyond Great Britain and Ireland."

Instead of Rule 4, on page 249, read as follows:

RULE 4.—PREPAID REPLIES.—The sender of a message may prepay the reply as follows: The sender must insert, immediately after the address, and pay therefor, the words "Reply —— words, paid." The number of words paid for will be written in the blank space. In cases where more than one reply is required and prepaid, the sender must state the number of replies thus: Three replies, each — — words, paid."

For the instructions on page 253, above "RULES," read as follows:

"Messages are forwarded by the cheapest route, unless specially directed by any other. When there is more than one route to the same place at the same charge, and messages are not specially directed, they are forwarded by the best route at the discretion of the Telegraph Officials. The indication of route is charged between America and London or France. Beyond London or France it goes free. Messages destined for places to which there is no telegraph communication, must contain the name of the place from which they are to be posted The charge for postage is 37 cents."

The following is a revised list of tariffs, to be used instead of that given on Pages 251,-252 & 253 of Tariff Book:

TARIFF TO PLACES BEYOND GREAT BRITAIN, AND IRELAND, AND FRANCE.

On messages going beyond Great Britain, Ireland and France, charge the following rates, in gold, IN ADDITION TO THE TARIFF TO FRANCE:—Half-rates for each additional 10, or fraction of 10 words.

	Tariff for 20 words, or less.
Aden	$15 00
Algeria & Tunisia, via Marseilles	1 60
" via Malta	3 62
Australia—Port Darwin	46 62
New South Wales	47 88
South Australia	46 62
Victoria	47 12
Tasmania & Queensland	49 12
Austria & Hungary	1 50
Baden	1 50
Belgium	84
Beloudchistan	18 00
Benghazi	6 80
" via Falmouth	7 50
Ceylon	21 00
China—Hong Kong	30 00
Shanghai	30 00
To other places in China messages can be posted from Hong Kong or Shanghai without extra charge.	
Cochin-China—Saigon	28 50
Corfu	2 50
" via Falmouth	4 38
Corsica	1 04
Denmark	1 40
Egypt—Alexandria, via Turkey	6 46
" " Falmouth	7 50
Cairo " Turkey	6 46
" " Falmouth	8 50
Suez " Turkey	6 46
" " Falmouth	8 50
Suez Canal and Isthmus of " Turkey	7 20
" " Falmouth	9 25
Germany, except Baden and Wurtemburg	1 10
Gibraltar	2 75
Greece, via Turkey	2 50
" " Corfu	3 53
" " Falmouth & Volo	4 50

GREEK ISLANDS.

Spezzia & Zante, via Volo	2 84
" " " Corfu	3 66
" " " Falmouth	5 12
Cephalonia & Ithaca, via Volo	2 84
" " " Corfu	3 66
" " " Falmouth	5 50
St. Maure " Volo	2 62
" " Corfu	3 96
" " Falmouth	5 12
Syra " Volo	3 12
" " Corfu	3 96
" " Falmouth	5 75
Holland	1 00
Hungary	1 50

	Tariff for 20 words, or less.
India—West of Chittagong and Kurrachee	20 00
" East of Chittagong	21 00
Italy and Sicily	1 88
" " via Gibraltar	3 75
Japan—Nagasaki	35 00
To other places in Japan messages can be posted from Nagasaki without extra charge.	
Java—Batavia and Weltervreden	29 88
West of Samarang	30 12
East of Samarang	30 63
Luxembourg	1 50
Malta	2 50
Montenegro	1 62
Norway	1 80
Orkney and Shetland Islands	50
Penang	23 50
Persia, via Teheran	6 12
" " Turkey	7 88
" " Malta	9 00
Portugal	2 00
Portugal via Falmouth	2 62
Roumania and Servia	1 88
Russia in Europe	2 50
Russia in Caucasus	3 00
Russia in Asia, 1st Region, West of Tomsk	4 00
Russia in Asia, 2nd Region, East of Tomsk and West of Werkline Oudinsk	5 62
Russia in Asia, 3d Region, East of Werkline Oudinsk	9 16
Scilly Islands	88
Singapore	27 50
Spain	1 75
Spain, via Falmouth	3 12
Sweden	1 75
Switzerland	1 46
Tripoli	4 90
Tripoli, via Falmouth	5 62
Turkey in Europe	2 25
Turkey in Europe, via Falmouth	4 50
Turkey in Asia—Seaports	3 12
" via Falmouth	5 38
Inland	3 96
Inland, via Falmouth	6 12
Turkey, Islands of, viz:	
Crete or Candia	4 80
Crete or Candia, via Falmouth and Volo	6 50
Cyprus	4 16
Cyprus, via Corfu	6 00
Mytelene	3 96
Mytelene, via Falmouth and Volo	5 75
Rhodes	3 96
Rhodes, via Falmouth and Volo	5 75
Samos	3 96
Samos, via Falmouth and Volo	5 75
Scio	3 96
Scio, via Falmouth and Volo	5 75
Wurtemburg	1 50

CUBA CABLE.

The notice in relation to "Cable to Aspinwall," published in last JOURNAL, is hereby countermanded.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Oct. 22, 1872.

The following Offices have been transferred from Jas. Coleman's District to J. B. Tree's District:

Memphis, Tenn.
Clarksville, "
Humboldt, "

G. H. MUMFORD, Vice-Pres't.

EXECUTIVE OFFICE,
NEW YORK, Oct. 31st, 1872.

On and after November 4th, *Opelika, Ala.*, will be added to the list of money-order offices in C. G. Meriwether's District, and *Greensboro, Ala.*, will be stricken from the list of money-order offices in same district.

G. H. MUMFORD, Vice President.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York.
November 1, 1872.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular.

GENERAL INFORMATION.

Communications relating to checks, or otherwise, with the White Mountain "Summer" officers in N H., *now closed*, may be addressed to Geo. W. Gates, Supt. White River Junction, Vermont.

Covington, Ga., closed.
Dalton, Ga., re-opened.
329 Mound City, Ill., is in Pulaski Co.
368 Mounds, Ill., is in Brown Co.
299 Newport, Ind., is in Vermillion Co.

Messages may be taken for Greenupsburg and Riverton, Ky., to be delivered from Haverhill, Ohio. Charges for delivery, 25 cents.

Cambridge, Md., check direct.
Colebrook, N. H., should read, 50 3 14 Portland, Me.
Plaistow, N. H., closed.
Rochester N. H., should read, 25 2 17 Great Falls, N. H. / 30 2 14 Portland, Me.
Dickson, N. Y., closed.
Pleasant Valley, O., P. O. A., Plain City, O.
Urichsville, O., closed. Messages for Urichsville are delivered from Dennison, Tuscarawas Co., O. Charges for delivery, 25 cents.
Avenue Drove Yards, W. Phila., now W. Union office, check direct. Tariff ten cents more than Philadelphia, Pa.
102 Keating, Pa., is in Clinton Co.
Rockdale, Delaware Co., Pa., P. O. A. is Glen Riddle, not Lenni Mills, as given in tariff book.
Highgate Springs, Vt., closed.
Blacks and Whites, Va., closed.
Strasburg, Va., should read, 45 3 77 Alexandria, Va., instead of 20 2 108 Winchester, Va.

NEW OFFICES.

286 Cooper, Ala.
285 Cunningham, Ala.
285 Gilmans, Ala.
285 Wilhites, Ala.
* Decatur, Ind. 60 4 242 Richmond, Ind. / 25 2 261 Fort Wayne, Ind.
* Geneva, Ind. 50 3 242 Richmond, Ind / 35 2 261 Fort Wayne, Ind.
* Newport, Wayne Co., Ind. 25 2 242 Richmond, Ind. / 65 4 261 Fort Wayne, Ind.
* Portland, Ind. 40 3 242 Richmond. Ind. / 261 Fort Wayne, Ind.
* Mill Bridge, Me 25 2 9 Cherryfield, Me.
231 Blissfield Junction, Mich.
* Fayette, Hillsdale Co., Mich. 25 2 231 Blissfield Junction, Mich.
* Morenci, Mich. 25 2 231 Blissfield Junction, Mich.
* Crow Wing, Minn. 150 10 307 Chicago, Ill.
388 Alexandria, Mo.
465 Falls City, Neb.
474 Firth, Neb.
52 Port Oram, N. J.
203 Hanging Rock, Ohio.
203 Haverhill, Ohio.
202 Junction City, Ohio
212 Kirby, Ohio.
202 Somerset. Ohio.
59 Bingen, Pa., check Quakertown, Pa.
340 Middleton, Tenn.
480 Jacksonville, Texas.
486 Spring Station. Texas.
570 Camp Stambaugh, Wy.

OFFICES HAVING "SPECIAL SHEET A"

Will hereafter check Lansingburgh and Cohoes, N. Y., same as "Special Rate" to Troy, N. Y.

WILLIM ORTON,
President.

THE annual report of the Western Union Telegraph Company, recently published, is a synopsis of facts which command attention, by their very magnitude. As a single item, let the reader consider fully in his own mind how much is meant by the statement that the company owns and has in operation 137,190 miles of wire—enough to reach nearly six times around the globe. On the 30th of June last the Company had in its employ 8,347 persons, and had open for business 5,237 offices. The messages sent over the wires of the Western Union last year numbered 12,444,449, an increase of 1,798,422 on the business of the previous year. The earnings of the Company are enormous, but its present policy is to extend its lines and perfect its equipment rather than pay dividends, and accordingly no dividends are to be paid this year. From its inception the Western Union has been a corporation in which Cleveland has felt a special interest. Its founder and its ablest managers have been Cleveland men, and here for years was the centre from which its vast interests were managed. It is one of the most colossal, enterprising and successful corporations of modern times.—*Cleveland Leader, Oct.* 16, 1872.

LIST OF SUBMARINE CABLES NOW IN OPERATION.

Date when Laid	*From*	*To*	*Length in Miles.*
1851	Dover	Calais	25
1853	Denmark, across belt	Donaghadee	18
"	Dover,	Ostend	76
"	Port Patrick	Donaghadee	25
1854	Port Patrick	Whitehead	27
"	Sweden	Denmark	12
"	Holyhead	Howth	65
1856	Prince Edwards Island		12
"	St. Petersburg	Cronstadt	10
"	Across Amazon		105
1857	Norway Fiords		49
"	Ceylon	Mainland	30
"	Ceylon	Mainland	30
1858	England	Holland	129
"	Norway Fiords		16
1859	Denmark	Heligoland	46
"	Isle of Man	Whitehaven	36
"	Sweden	Gottland	64
"	Folkestone	Boulogne	24
"	Malta	Sicily	60
"	Jersey	Piron	21
"	Lynas	Great Ormes Head,	19
"	Ayr	Mimbre Island	19
1860	Great Belt		14
"	Great Belt		14
"	Iviza	Majorca	74
1861	Dieppe	New Haven	80
1862	Wexford	Aberman	63
"	Lowestoft	Zandvoort	125
1864	Gwadur	Elphinstone Inlet	357
"	Mussendom	Bushire	393
"	Bushire	Fao	154
"	Gwadur	Kurracheo	246
"	Otranto	Avlona	50
1865	Trelleborg	Rugen	55
"	South Foreland	Cape Grisney	25
1866	Valentia	Hearts Content	1896
"	Valentia	Hearts Content	1852
"	Lyall's Bay	White's Bay	41
"	Crimea	Circassia	40
"	Colonia	Buenos Ayres	30
"	England	Hanover	224
"	Cape Ray	Aspee Bay	91
"	Leghorn	Corsica	65
"	Persian Gulf	Additional Cable to connect Jasks	160
1867	South Foreland	La Panne	47
"	Malta	Alexandria	925
"	Havana, Cuba	Key West	125
"	Key West	Punta Rassa	120
"	Placentia	St. Pierre	112
"	St. Pierre	Sydney	188
"	Arendal	Hirtshalts	66
1868	Havana	Key West	125
1869	Peterhead	Egursand	250
"	Grisselhamn	Nystadt	96
"	Newbiggin	Sondervig	334
"	Malta	Sicily	54
"	Tasmania	Australia	176
"	Scily Isles	Land's End	27
"	Bushire	Jask	505
"	Brest	St. Pierre	2584
"	St. Pierre	Duxbury	749
"	Moen	Bornholm	80
"	Bornholm	Liban	230
1870	Salcombe	Brignogan	101
"	Beachy Head	Cape Antifer	70
"	Suez	Aden	1440
"	Aden	Bombay	1818
"	Parthenrno	Lisbon	823
"	Lisbon	Gibraltar	881
"	Gibraltar	Malta	1120
"	Marseilles	Bona	447
"	Bona	Malta	336
"	Madras	Penang	1408
"	Penang	Singapore	400
"	Singapore	Batavia	533
"	Malta	Alexandria	904
"	Jersey	Guernsey	16
"	Guernsey	Alderney	18
"	Zante	Trepito	11
"	Sunium	Thermia	95
"	Porto Rico	St. Thomas	110
"	Santiago	Jamaica	140
"	Portpatrick	Donaghadee	25
1871	Villa Real	Gibraltar	155
"	Singapore	Saigon	630
"	Saigon	Hong Kong	975
"	Hong Kong	Shanghai	1100
"	Shanghai	Nagasaki	1200
"	Nagasaki	Vladivostock	
"	Rhodes	Marmarice	99
"	Latakiah	Cyprus	86
"	Samos	Scala Nuova	11
"	Myteleni	Aivali	13
"	Khania	Retimo	33
"	Ret mo	Khandia	41
"	Khandia	Rhodes	201
"	Zante	Corfu	150
"	Zante	Cephalonia	18
"	Lowestoft	Greitsell	223
"	Anjer	Telock Betong	55
"	Banjowangie	Port Darwin	1083
"	St. Thomas	St. Kitts	133
"	St. Kitts	Antigua	90
"	Antigua	Guadaloup	84
"	Guadaloupe	Dominica	55
"	Dominica	Martinique	69
"	Martinique	St. Lucia	65
"	St Lucia	St. Vincent	64
"	St. Vincent	Barbadoes	150
"	St. Vincent	Grenada	80
"	Grenada	Trinidad	130
"	Trin dad	Demerara	350

BORN.

ADAMS.—At Cedar Falls, Iowa, Sept. 24. 1872, a son to George D. Adams, Agent and Operator B. & M. R. R. R., Russell, Iowa.

BOOTH.—At Salineville, O., Oct. 9, 1872, a son to M. E. Booth, Manager W. U. Telegraph Office, Salineville, O.

MARSH—At Pittsburgh, Pa., Oct. 18, 1872, a son to F. H. Marsh.

PHILLIPS—At Olathe, Kan., Sept. 1, 1872, a daughter to Marshall Phillips, Manager W. U. Tel. Office.

MARRIED.

ARTHUR—HUDD.—At Beaver, Pa., Oct. , 1872, by Rev. L. H. Lock, J. G. Arthur, Manager W. U. Telegraph Office and Express Agent, Hanover, O., to Miss Mattie Hudd, of Hanover.

COCKERELL—WHARTON—At Belle Centre, O., Oct. 15, 1872, by Rev. Mr. Shockey, T. W. Cockerell, Operator A. and G. W. Ry., Mansfield, O., to Miss Sierra Nevada Wharton of Belle Centre.

MELLEN—EVANS—At Salem Church, Pettis Co., Mo., Oct. 13, 1872, by Rev. Josiah Godbey, J. H. Mellen, Manager W. U. Tel. Office, Smithton, Mo., to Miss Charlotte H. Evans, both of Smithton

POOLE—CARSON—At North Conway, N. H., Oct. 9, 1872, C. J. Poole, Manager W. U. Tel. Office, North Conway, to Miss Annie M. Carson, of Conway.

DIED.

CONNELL—At Janesville, Wis., Oct. 1872, of Inflammation of the Bowels, James Connell, Telegraph Operator. His remains were taken to his home at Olean, N.Y. for interment.

WE learn from Buenos Ayres that Mr. Burton has recently added 386 miles of telegraph to the thousands already working through the provinces.

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L. S. Sibin
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JOURNAL OF THE TELEGRAPH.

VOL. V. NO. 24. NEW YORK, NOVEMBER 15, 1872. WHOLE NO. 121.

RHEOCORDS AND RHEOSTATS.

For making exact measurements of small resistances, Poggendorffs Rheocord, is admirably adapted. The following cut, figure 1 will serve to illustrate the construction of the instrument :

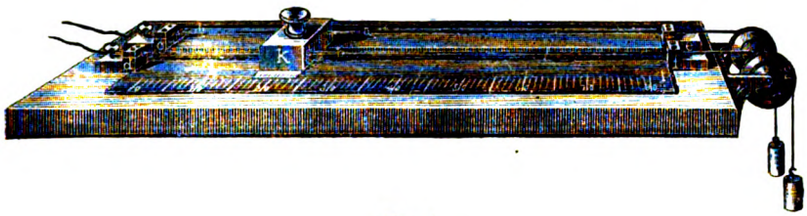


Fig. 1.

Two platinum wires *a*, *b*, are stretched out on a board, and the terminals of each pressed between two metalic plates ; the termini of *a* by *c* and *e*, and those of *b* by *d* and *f*. The terminals of *a* and *b* after passing through the plates at *e* and *f* are also attached to silken strings passing over pulleys and fastened to weights. A brass measuring rule *h*, *i*, is placed under the wires, which are insulated from the metallic plates *c*, *d*, and *e*, *f*. A slide, K, consisting of a small square metallic box whose sides turned towards the clamps are composed of parallel panes of glass or ivory, moves up and down on the measuring rule. In the glass or ivory panes, small holes are made, through which the wires can barely pass, and the box is filled with mercury.

When the clamps *c*, *d*, are connected with the poles of a battery, the current from *c* passes through the wire *a* to the box *K*, thence through the mercury which is contained in it to the wire *b*, and thence to the other pole. If the box is moved to the right, the length of the connecting wire is increased, and if pushed to the left, diminished. The measuring rule indicates the extent of the increase or decrease of the wire when the box is moved. Knowing the resistance of the German silver wire stretched between the clamps, as well as the resistance of every fractional division of it, the smallest sub-division of the wire may be employed as a unit of measurement for determining resistances either by the differential or substitution methods.

When greater resistances are to be measured, standard resistance coils or Rheostats made of German silver wire are employed. The most simple arrangement of such a resistance apparatus is represented by figure 2. A series of short metallic bars are placed at equi-distance upon a board in such a

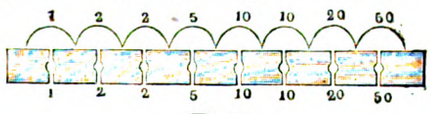


Fig. 2.

manner that they can be connected together by means of brass plugs. The brass bars are attached to the extremities of the various German silver coils of wire which compose the various resistances represented. If all the holes are plugged then no resistance is inserted. If any hole is unplugged then as many units of resistance are inserted as are indicated by the numbers standing under the hole. By adding up the numbers unplugged we ascertain the total resistance inserted. The resistance coils are protected by a box, on whose upper plate the binding screws for connecting the line and battery wires are placed, as represented in figure 3. When very great resistances are required Rheostats are made as represented in figure 4.

This is a compilation of sixteen separate resistance coils, ranging from one British Association unit, or ohm, to five thousand B. A. units or ohms securely enclosed in a mahogany or rosewood box, A. The extremities of resistance 1, are attached to the metallic plates *a* and *b*, those of the next resistance 2, to *b* and *c*, and so on. When the holes between the clamps or metallic plates are not plugged, the respective resistance is inserted. The extremities of the wires to which the Rheostat is to be connected are inserted in the binding screws 1 and 2. The metallic spring F, fixed at 1, can be connected with 2, and thus short circuit the resistance coils, or throw them all out. This attachment is rarely ever

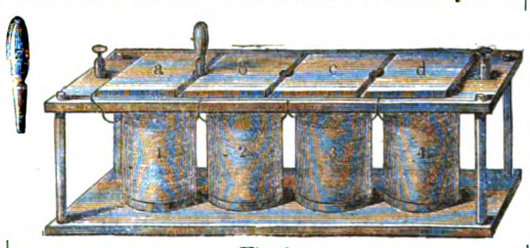


Fig. 3.

employed in resistance coils, made or used in this country, but instead of it an infinity clamp is employed, which when left unplugged, leaves the apparatus open or disconnected. The scale is formed for putting in of any portion or all of the resistance, as desired. When the holes are plugged as represented in the cut, a resistance of 4,478 units is given.

In making a resistance coil care should be taken to wind one-half of the coil in one direction, and the other half in the opposite direction in order to prevent induction. A current exerts an inductive action upon the wire through which it flows called the induction of a current open itself, the effect of which upon a coil is to produce an induced current at the moment that a current commences to flow through the coils, and another at the moment when the battery current is broken. By winding the coils as suggested, this difficulty is prevented as the inductive effect is neutralized.

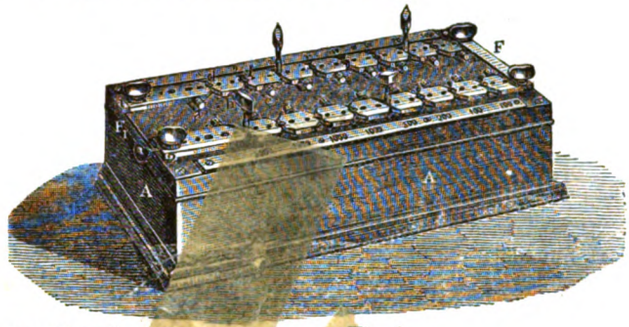


Fig. 4.

IS ELECTRICITY GENERATED BY WATER CURRENTS?

Zöllner has ascribed the production of the electric currents of the earth to the incandescent molton masses in motion beneath the crust which generate currents in the direction of their own motion ; and he has expressed the opinion that all current movements of fluid, especially when in contact with solid bodies, are to some extent accompanied with currents of electricity that have the same direction as the fluids themselves. He inserted the ends of the copper wires of a very delicate galvanometer, of Sauerwald, just within the wall of a caoutchouc tube conveying a stream of water, and observed a deflection of several degrees of the galvanometer scale, thereby indicating the existence of an electrical current whose direction is that of the water. The greater the distance between the ends of the wires—which, by the way, need not be exposed to the force of the current, but may be replaced by metallic plates lying against the wall of the tube—the stronger the deflection of the needle.

While recently repeating Zöllner's experiments. Beetz obtained similar results, but found that the currents have a much similar origin. The needle is deflected so long as the reservoir in which the water falls is not isolated. The metal tap, the stream of water, and the reservoir, in fact, form a voltaic element (brass, water, lead) whose current it is which deflects the needle. By filling the reservoir, and dipping the free end of the tube, also filled, into it, the current is observed though the water be shut off, nor does any change take place when the tap is opened. By simply inverting the position of the tube, the direction of the current is reversed ; this is observed to be the case with or without the flow of water. If the reservoir be isolated, no current is formed ; this is so whether the water be allowed to flow or not. When tap and reservoir are of zinc, no current is produced with or without a flow of water, and with or without isolation of the reservoir. According to Beetz's observations, then, no electricity is generated by a stream of water.

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ELECTRICAL BATTERIES.

Mr. E. G. Bartholomew lately read a paper on this subject before the Society of Engineers, London.

The author said he has always regarded it as an apt illustration, to draw a parallel between the electric telegraph and the steam engine. The conductor may be compared to the steam pipe; the one conveys the electricity from its source, the battery, to act upon the instrument: the other conveys the steam from its source, the boiler, to act upon the engine. Again, the instrument will bear a strict comparison with the engine, for both are mere machines constructed in such a manner as to be best influenced by the power conveyed to them. There then remains, in either case, the source of power. Now, what a steam engine would be without the boiler, a mere combination of inert pieces of mechanism, the electric telegraph would be without the battery. For this reason it has been thought that the battery forms a subject worthy of a separate notice.

The progress of telegraphy may indeed be regarded as dependent in a large degree upon our knowledge of the battery.

The identity of electricity, from whatever source derived, whether from the friction of certain substances, from evaporation, from the chemical action set up under certain conditions, from magnetism, or from heat, is not doubted. It may differ in degree but not in nature. If it be true, as has been asserted, that when we eat an egg with a metal spoon we generate electricity, the electricity so evolved will be identical with the flash which rends the oak. And certain substances, and certain combinations of substances, afford greater facilities for the development of the force than others; and it has been a part of the study of the modern philosopher to ascertain by what means the greatest amount of electrical force can be obtained at the least possible cost. The well-known story of Galvani's accidental discovery of a force hitherto unsuspected requires no repetition here, nevertheless, we are bound to ascribe to him the honor of finding that certain metals, when converted by a fluid, would develope electricity; and when Volta subsequently produced a real battery by examining the laws of production and multiplying the combinations, he only followed in the path his predecessor had indicated.

The simplest voltaic combination is that in which two metals, as copper and zinc, having different affinities for oxygen, are immersed in a liquid capable of oxidizing one of them. Under such conditions a current of electricity is generated upon the surface of the most oxidizable, and, passing through the liquid, is given off at the other metal; and if a wire connect the two plates the current will continue to flow through it, from the receiving to the generating plate, so long as the necessary conditions are fulfilled.

It has been ascertained that those metals or substances which differ most in their affinity for oxygen will form the most powerful combination. The order of the substances is as follows: Graphite (carbon from gas retorts), platinum, silver, copper, iron, lead, tin, zinc. Hence a combination of graphite and zinc forms a powerful battery, and, as both substances are comparatively cheap, this form of battery is of frequent occurrence. The great desiderata in a battery required for telegraphic purposes are its ability to overcome R (or resistance) and its constancy in action. The power a battery possesses of overcoming R is called electromotive force.

There are two distinct characteristics in a battery, dependent upon the order in which the same combinations are arranged; thus, if one pair of large plates, say 12 inches by 12 inches, be employed, the quantity of electricity generated will be considerable, although the electromotive force will be small. If, however, a similar pair of plates be cut up into 144 pieces 1 inch by 1 inch, and the 144 combinations be so arranged in 144 separate cells as that the − plate of the one be connected with the + plate of the next, and so on throughout the series, a battery is then obtained possessing 144 times more electromotive force. Its latter property is termed its tension, and is applied to the entire series, the electromotive force being more strictly applied to the specific energy of each combination.

Where great energy is required, the Grove Battery becomes the most valuable of all combinations. In this arrangement amalgamated zinc and sheet platinum are employed, separated by a porous diaphragm. The zinc stands in a strong solution of acid sulphur, and the platinum in pure nitric acid. The action is as follows: The hydrogen element of the decomposed water, instead of passing over to the collecting plate and forming upon its surface, is entirely suppressed by the nitric acid, which becomes slowly deoxidized and converted into nitric acid, which passes off in dense red fumes. This is a serious drawback to the use of this battery.

One of the most valuable batteries for telegraphic purposes, where a constant current is not required, is the Leclanche. It consists of a zinc rod placed in a solution of common chloride of ammonia (sal ammoniac), in which stands a porous pot containing a piece of carbon surrounded by a mixture of gas carbon and a peculiar form of peroxide of manganese broken into small pieces, but separated from any powder. When the battery is in action, chloride of zinc is formed. When the sal ammoniac has become nearly removed from the liquid, it cannot dissolve the chloride of zinc, and the liquid becomes milky; more of the salt must then be added.

In a battery consisting of many plates in a series, all the plates should be of the same size, and all the cells in the same condition, as one faulty cell will not only rob the entire series of the value of itself, but will injure the action of the whole. Every cell of a battery should therefore be periodically tested separately, and, if the quantity of any one cell be less than the average of the others, it should be rejected or remedied. The battery itself, although the source of power, yet possesses resistance to the passing of its own current.

ON THE ORIGIN OF ATMOSPHERIC ELECTRICITY.

[From the American Artisan.]

BY DR. ADOLPH OTT.

There are few departments of physical science in which more hypotheses have been framed regarding the origin of a force than in that which treats of the electricity exhibited by the air. At the time when only frictional electricity was known, the phenomena of atmospheric electricity were sought for in the friction of the air against the clouds and the earth.

Priestly was of the opinion that there existed an empty space above the clouds, having an electricity opposite to that of the earth. "May not thunder and earthquake," he inquires, "be owing to the re-establishment of the equilibrium between the two electricities?" Franklin entertained the opinion that the sea conveys to the air the electricity with which it is charged, and Volta sought it in the evaporation of water at the service of the earth. This view was also adopted by Pouillet, to whom we owe quite a number of original experiments. This scientist found that electricity is always produced when the evaporating water holds in solution gases, acids, or salts. The steam becomes positively electrified, the solution negatively. Reich confirmed those experiments, but he showed also that the signs of electricity must not be attributed to evaporation, but to the friction of the finely divided liquid against the sides of the platina capsule used in the experiment. Again, signs of electricity are only obtained when the liquid boils, never by slow evaporation. It is known that Pouillet considered the act of vegetation as another source of electricity in the air. We know that plants yield carbonic acid, while they inhale oxygen. If it be true, says that philosopher, that carbonic acid is positively electrified at the moment of its being set free, it follows that plants ought to yield positive electricity. He tried to verify this supposition directly by experiment. Riess, however, showed that electricity produced by vegetation was very variable; now negative and then positive; and investigations with earth alone left little doubt that the signs of electricity afforded are not due to the process of vegetation. In fact, it follows from all investigations of Riess and Reich that the conclusions arrived at by Pouillet regarding the origin of electricity by evaporation as well as vegetation are not demonstrated by experiment. Thus, the only opinion which presented some degree of probability has fallen to the ground. Peltier, Jr., propounded an altogether new theory regarding this subject, which is now entertained by the most distinguished physicists of the day. Lamont, in Munich, explains this theory substantially as follows:

The earth possesses a fixed quantity of negative electricity, the distribution of which only is changeable. Let us call this electricity the permanent electricity of the earth, in contradistinction to the induced one, generated by an isolated body, when approached by another electric substance. The atmosphere, viz., *the pure air, possesses no electricity whatever;* it is neither capable of conducting nor retaining electricity. If our earth had a perfectly smooth and uniform surface, all points would exhibit an equally strong tension; however, this equilibrium is disturbed by two agencies, namely, by the elevations of the globe itself, and the vapors floating in the air.

It is a well-known fact that electricity collects preferably in points and edges, whence the fact explains itself why it accumulates on roofs, church-towers, mountain-summits, and that collecting apparatus become charged the more the higher they are elevated from the ground.

The second above-mentioned cause which brings about an unequal distribution of electricity on the earth's surface is the watery vapor contained in the air. In this case, the vapor may either be in contact with the earth, or it may be isolated. In the first instance, the same phenomena take place as upon mountains—the electricity leaves that part of the earth's surface in contact with the vapor, and collects on the surface of the latter. With regard to the second case, it is to be considered that all bodies may contain latent or disguised electricity in unknown quantities, which is set free, according to known laws, when another electric body is approached. Thus it is explained why clouds, floating in the air by the distributing action of the earth, become now positively and now negatively electrified.

By this theory, the various indications of electro-atmospheric instruments find as simple and easy an explanation as by the hypothesis of the electricity of the air. Upon an electrometer provided with a point, the *negative electricity of the earth* acts under a clear sky, distributing in such a manner that the positive electricity of the isolated system is drawn

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into the pendulums, while the negative escapes through the point. It is evident, on the other hand, that, in the systems of Lamont and Delmann, where a ball is brought into connection with the ground, *negative electricity* must stream in. If the observations are conducted under a cloudy sky, after continuous rain, and when the air is saturated with vapors, so that the clouds are in conducting connection with the earth, the electrometer exhibits *no tension*. In this case, the electricity has collected at the upper borders of the clouds, the observer being in the interior of the electrified body, in which, as little as in a room, electric tension can exist.

Electrified clouds isolated from the earth react distributing on the latter. A negatively electric cloud induces a decrease of the permanent electricity of the earth's surface, and, if strongly charged, may bring about an accumulation of positive electricity at those points above which it floats. A positively electric cloud, on the other hand, will increase the permanent negative electricity of the earth.

The electrical phenomena which take place in the atmosphere have thus received a basis for rational explanation, and it is to be seen whether by, further investigations, this theory will be confirmed or rejected.

LAWS OF MAGNETISM.

1. A magnetic field is any space in the neighborhood or under the influence of a magnet.

2. The unit pole is that which at a unit distance from a similar pole is repelled with unit force.

3. The intensity of a magnetic field at any point is equal to the force which the unit pole would experience at that point.

4. The direction of the force in the field is the direction in which any pole is urged by the magnetism of the field; this is the direction which a short, balanced, freely suspended magnet would assume.

5. An uniform magnetic field is one in which the intensity is equal throughout, and hence the lines of force parallel.

6. Opposite poles attract each other; similar poles repel each other.

7. The forces directed from any magnetic point upon equal masses are reciprocally proportional to the square of the distance.

8. When two magnets are very small, and the distance between them very great in proportion to their length, the magnetic action between them is reciprocally proportional to the cube of their distance.

9. The force directed from any magnetic point upon any other mass upon which it acts is reciprocally proportional to the square of the distance. The total action between them is, however, reciprocally proportional to the third power of the distance when the latter is great.

10. Magnetic forces between a suspended magnet and anv mass upon which it acts are proportional to the number of oscillations which (under their mutual action alone) the same magnet makes in a given time.

11. Magnetic forces between a suspended magnet and any magnetic mass are inversely proportional to the square of the time which the suspended magnet takes to complete one oscillation.

12. The attraction of a magnet for an armature is proportional to the square of its free magnetism.

13. The magnetism excited at any given transverse section of a magnet is proportional to the square root of the distance between the given section and the nearest end of the magnet.

14. The free magnetism at any given transverse section of a magnet is proportional to the difference between the square root of half the length of the magnet and the square root of the distance between the given section and the nearest end.

15. The mean horizontal component of the earth's magnetism in England, for 1865, was — 1·764 (metrical) units of force—i. e., a unit pole weighing one gramme, and free to move in a horizonal plane, would, under the action of the horizontal force of the earth's magnetism, acquire, at the end of a second, a velocity equal to 1·764 metres per second.

ELECTRICITY AND LIFE.

MM. Robin and Legros, experimenting with noctilucæ, those little organisms which produce in great part the phosphorescence of the sea, found that on passing a current through some sea-water in the dark, its course was marked by a luminous trace, the phosphorescence of the animals being excited by the electricity.

Induction currents retard or arrest the circulation, by contracting the blood-vessels. Continuous currents, however, generally have an opposite effect. MM. Onimus and Legros have further established the law, that a descending current dilutes the vessels, while an ascending current contracts them. Part of the cranium of a healthy dog was removed; the positive pole of a strong pile connected with the brain, the negative pole with the neck. The superficial vessels of the encephalon were visibly contracted, and the organ appeared to be weakened. On reversing the position of the poles, the opposite effect was observed. By means of an ophthalmoscope, the fine blood vessels on the retina of a living person's eye may be observed; and if the head be electrified, these will be visibly distended.

The effect of an electric current on bodies newly dead was studied by Aldini, who thus produced violent motions in the bodies of guillotined persons. Similarly, Ure experimented in Glasgow on the body of a man that had just been hanged. Using a battery of 270 couples, he connected one pole with the spinal marrow at the nape of the neck, and the other with the heel, whereupon the leg was moved so vigorously as to knock over one of the attendants. He succeeded also in producing motions in the chest, the abdomen and the features of the face.

Recent research has defined the conditions of such influence on the muscles. Continuous currents applied directly cause contractions at the moments of opening and closing; but the shock on closing is much the stronger. While the current is passing, the muscle remains in a state of semi-contraction, the nature of which is not agreed upon by physiologists. Under excitation frequently repeated, and prolonged a certain time, the muscles get into a state of contraction resembling that in tetanus. While in this state they are in constant minute vibration.

Induction currents cause more energetic contractions, but this energy does not last long, and, if the electrification is continued, gives place to cadaverous rigidity. In both the foregoing cases there is a local elevation of temperature, proportional to the force and duration of the electric action. This reaches its maximum (sometimes 4°) in four or five minutes after the electric action has ceased. The muscular contraction disengages heat.

The action on the nerves is more complex. MM. Onimus and Legros state that in the case of motor nerves, the direct or descending current from a battery acts more energetically than the other; the reverse being the case with the sensory nerves. The sensation experienced in these cases (which refer to continuous currents) is insignificant; induction currents, on the other hand, produce a pain, which continues to be felt so long as the nerve retains its excitability.

If a frog is kept some time in tepid water at 40° it dies. If then taken out, and its spinal cord electrified by an ascending current, vigorous contraction ensues; a descending current produces no motion. On the other hand, if the latter be applied to a decapitated animal, in which reflex motions are being caused by the excitation of the spinal cord, it tends to paralyze them.

In general, the battery current applied to a cord, if an ascending one, increases the excitability of this organ, and therefore its power if causing reflex action; the descending current acts in the opposite way.

When the brain is electrified, the animal does not give signs of pain, but of calm stupor, and tendency to sleep. Some have proposed electrification as a means of developing the intellectual faculties; but there is no evidence that it will thus act. On the other hand, extreme care is necessary in electrifying the encephalic parts, as a strong current may produce rupture of the vessels, and serious hemorrhage.

Electricity stimulates all the other organs of sense, producing luminous effects in the eye, sound in the ear, taste in the tongue, odor in the nose.

Applied to the nerves of the nutritive organs, it has the effect of suppressing spasmodic movements which are not subject to the will.

The German theories as to the electrotonic properties of the nerves when electrified were opposed by Matteucci, who urged the obvious phenomena of electrolysis, that is to say, the chemical decompositions caused by the currents. He thought the modifications in nervous excitability produced on the passage of electricity were due to acids and alkalies arising from the decomposition of salts in the animal tissues. To this class of phenomena may be added the electro-capillary currents recently discovered by M. Becquerel.

The effects of electricity on plants have not been so closely studied. It is known to produce contractions in the mimosa and other sensitive plants and to retard the motion of sap. M. Becquerel has studied its influence on germination and development. It decomposes the salts contained in the seed, the acid elements being carried to the positive pole, and the alkaline portions to the negative. Now the former are hurtful to vegitation, while the latter favor it.

M. Becquerel has, further, quite recently examined the influence of electricity on the color of plants. The discharge from a powerful machine produced remarkable changes of color on the petals, due, he thinks, to the rupture of cells containing coloring matter. Deprived of this cellular envelope by washing, the flower becomes white.

An apparatus has recently been devised in Germany for obtaining specimens of water from any desired depth of the ocean. A strong, heavy vessel, entirely closed and empty, has a valve through which water may be admitted, but which is only put in motion by powerful electro-magnets connected therewith. This vessel is lowered to the required depth, and then the electric shock applied. The valve opens, the water rushes in, and the vessel is raised again to the surface.

A Substitute for Flogging.—A writer in the *Pall Mall Gazette* suggests that, instead of the application of the "cat" to the backs and shoulders of garroters and other criminals, as at present practised in London, they should be punished with severe currents of electricity or galvanism, which might be so managed as to give the most intense pain, yet not tear the flesh or break bones.

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FOREIGN TELEGRAPHIC ITEMS

ANOTHER TRANSATLANTIC CABLE TO BE LAID AT ONCE.

A telegram, dated Lisbon, Nov. 13, 1872, states that the Government of Portugal has signed a concession to the Falmouth and Malta Telegraph Maintenance and Construction Company, empowering them to lay an electric telegraph cable from Portugal to Brazil.

This enterprise is the same referred to in the JOURNAL upon several occasions, in which the Baron de Mana is mentioned so prominently.

As the Brazilian Government has already made the necessary concession, it is to be presumed that no delay will occur in carrying the project through successfully. The concessionary is to have a monopoly for twenty years, under certain restrictions as to charges, and to have the use of the cable for the succeeding twenty years without monopoly. Contingent upon a certain increase of business, he may be required to lay a second cable. The concessionary may, before 1877, lay cables to the West Indies and Senegal, and may also lay cables along the coast, to points authorized by the Government.

ADVICES from Kingston, Jamaica, of Oct[illegible]th, by steamer St. Thomas, at this port, state that the Colon cable has been successfully laid, but Sir Charles Bright has not yet handed it over to the West India and Panama Railroad Company. He is working it at present for the public with his own staff, at the rate of ten words for five dollars. It is reported that his account against the West India and Panama Telegraph Company amounts to $675,000, and that, until they comply with the terms of his contract, he will hold possession of the Aspinwall cable. It is also stated that the telegraph company has not enough money to meet this demand at present. It is stated that their capital is something less than $395,000, unless they raise money by the issue of new debentures.

A sub-marine cable is contemplated between the present landing place of the Colon cable at Jamaica and Bermuda, to connect with the line which is to be laid next year from England, with an extension to New York. This route will be much more preferable to business men and the press, as they will thereby prevent the objectionable supervision and censorship of Spanish officials in Cuba.

A DESPATCH to the Associated Press, dated Havana, Nov. 11, says: "The impression that telegrams passing through this Island from and to other places are liable to censorship, is not correct. Only despatches originating or delivered in Cuba are subjected to that process."

A CONTRACT has been made by Hooper's Telegraph Works with Messrs. C. Mitchell & Co., shipbuilders, Newcastle-on-Tyne, for the construction of a steamer specially designed for the laying of submarine telegraph cables. This will be the first cable steamer specially built, and it is contemplated that a considerable saving will be effected in the cost of laying future submarine cables by its use. The vessel will be capable of taking 3,000 to 4,000 miles of cable in one length, and will be employed in the submergence of the Great Western Telegraph Company's cable now in progress of manufacture by Hooper's Telegraph Works, and of which about 1,000 miles have passed the tests of Sir William Thomson and Professor Fleeming Jenkin, the engineers of the company.

IN the Cape Parliament (South Africa), a vote of £25,000 has been made for the continuation of the telegraph to the diamond fields.

IN Western Australia a telegraph wire is being constructed between Perth and King George's Sound.

THE work of carrying the telegraph lines through the centre of Australia, from south to north, was performed single-handed by South Australia.

THE completion of the Australian Telegraph Company line is hailed with great joy in Melbourne, and a banquet to celebrate the event is to take place on the 15th inst.

A PRIVATE company has made a proposition to the Spanish Government to construct and maintain at its own expense lines of telegraph throughout the country.

A DESPATCH from Hong Kong, received at London, Nov. 12th, says, the telegraphic cable between that city and Shanghae has ceased to work. The cause of the interruption was unknown.

THE Russian telegraph land lines, connecting with the Nagasaki cable, are out of order through the overflowing of the Amoor river. At last advices the gap was 700 miles.

POST OFFICE TELEGRAPHS.—The total number of messages forwarded from Postal Telegraph Stations in the United Kingdom during the week ending the 12th October, 1872, and during the corresponding week of 1871: Week ending Oct. 12, 1872, 318,995; week ending Oct. 14, 1871, 268,730; increase in the week of 1872, on that of 1871, 51,275.

POST OFFICE TELEGRAPHS.—The total number of messages forwarded from Postal Telegraph Stations in the United Kingdom during the week ending the 19th October, 1872, and during the corrresponding week of 1871.—Week ending October 19, 1872, 313,388; week ending October 21, 1871, 256,377; increase in the week of 1872, on that of 1871, 57,011.

POST OFFICE TELEGRAPHS.—The total number of messages forwarded from Postal Telegraph Stations in the United Kingdom during the week ending the 26th October, 1872, and during the corresponding week of 1871:—Week ending October 26, 1872, 316,166; week ending October 28, 1871, 257,991; increase in the week of 1872, on that of 1871, 58,175.

THE Eastern Telegraph Company, with reference to their announced intention to lay a duplicate cable to Vigo and Lisbon, have intimated that when the cable is laid, early in the ensuing Spring, their tariff to Spain and Portugal will be materially reduced. They are also endeavoring to negotiate with India and other Governments for the adoption of a tariff which will enable the public to pay for the number of words sent, whether one or more, a system which is in successful operation on the Atlantic lines.

DURING a recent session of the Spanish Cortes, Senor Zorilla, President of the Cabinet Council, promised Senor Pascual, who had complained some days before of the wretched condition of the Spanish telegraphic service, that the Government would introduce a bill authorizing 12,000,000 reals to be applied to its improvement and reconstruction.

A PROPOSITION has been introduced in the Cortes to permit the use of cipher words in telegraph dispatches, which has hitherto been forbidden under the censorship.

ANNUAL MEETING OF THE TELEGRAPHERS' LIFE INSURANCE ASSOCIATION.

The annual meeting of the Telegraphers' Life Insurance Association was held at the General Office of the Western Union Telegraph Company, No. 145 Broadway, on the evening of Friday, November 1. We have received the reports of the Treasurer and Secretary; also, the names of the officers elected for the ensuing year, but, beyond this, no account of the proceedings.

The following is the list of officers:

Treasurer.....A. S. BROWN.
Secretary.....D. R. DOWNER.
Executive Committee.....GERRITT SMITH, A. B. CHANDLER, W. K. APPLEBAUGH.

The reports render a good financial exhibit.

Treasurer's Report.

NEW YORK, Nov. 1, 1872.

The following is respectfully submitted as the report of the Treasurer for the year ending November 1, 1872:

The present incumbent has held the office since the first of April last. At that time the retiring Treasurer presented a statement, showing a balance in the treasury of two thousand seven hundred and fifty dollars and forty-two cents, . . . $2,750 42

The receipts since that date have been as follows:

From 164 new certificates, numbers 1,513 to 1,676, inclusive,	246 00
Received from the Secretary an account of assessments,	6,192 09
Interest on deposits,	63 34
Total,	$9,251 85

The disbursements during the same period have been:

Paid to the heirs of G. H. Patriquin,	$792 00
" " " T. L. Brown,	882 00
" " " Jno. Grant,	872 00
" " " E. Sammis,	886 00
" " " R. Waterman,	869 00
" " " L. Q. Judge,	896 00
" " " F. A. Randall,	969 60
Postage, and printing assessment notices,	76 44
Stationery,	7 25
Refunded to C. A. Gaston, Memphis, by order Ex. Com.,	3 50
Secretary's and Treasurer's services,	79 34
Paid G. G. Small, for services in transferring names and accounts in Secy's books,	13 00
	$6,346 13
Leaving a balance in the Treasury,	$2,905 72

Of this amount there is payable to the heirs of Andrew Ainsworth an Assessment, No. 32, ... 911 00
Returns from Assessment No. 33, ... 896 00
Advance payments on Assessments, ... 195 00
Credited to the Reserve Fund of the Association, . . 903 72
$2,905 72

The Reserve Fund, above mentioned, has accrued partly from initiatory fees, but chiefly from the payment, by members, of assessments long over-due. As this fund is steadily increasing in amount, the disposition to be made of it becomes an important question. It has been suggested that it might be used to pay some future assessment, thereby releasing the members from the payment of the usual fee. If this course is adopted, it would be well to empower the Executive Committee to decide when the fund shall be so applied,

Nearly a year ago, President Orton, on behalf of the Western Union Telegraph Company, agreed to pay to the heirs of such deceased members of this Association as were, at the time of their death, in the employ of the Company, the sum of one hundred dollars. This sum has accordingly been paid to the heirs of C. A. Kellogg, Miss E. Sammis and F. A. Randall. This generous action on the part of the Company has greatly aided in extending our membership among Western Union employees, and the propriety of some acknowledgment from this meeting to the Company hardly needs to be suggested.

Respectfully,
A. S. BROWN, Treas'r.

New York, Nov. 1, 1872.

Secretary's Report.

NEW YORK, November 1, 1872.

The Secretary respectfully presents the following Report for the year ending October 31, 1872:

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Total number of Certificates issued by the Association to November 1, 1871		1255
Total number of Members in good standing	758	
Showing a loss—from all causes, since the organization of the Association—of . .	497	1255
Number of New Members added during the year	421	
Number of Members in good standing—previous Report, Nov. 1, 1871	758	1179
Losses during past year: Resignations .	3	
Non-payment of Dues,	187	
Deaths, . . .	11	201
Leaving in good standing, Oct. 31, 1872, . .		978

DEATH LIST:

No. of Assessment.	No. of Certificate.	Name.	Date, 1871.	Place.
24	947	Christopher Reynolds..	Nov. 6. 1872.	Gohen, N. Y.
25	180	Chas. A. Kellogg.....	Feby. 3.	Rochester, N.Y.
26	1185	Geo. H. Patriquin.....	Feby. 29	Tatamagouche, N. S.
27	446	Taylor L. Brown.....	Mar 3.	Athens. Tenn.
28	910	John Grant (of Canada)	Mar 3.	Atlanta, Ga.
29	209	Miss Emma Sammis..	Mar 17.	Brooklyn, N. Y.
30	528	Richard Waterman....	April 8.	Lafayette, Ind.
31	1258	Miss L. Q. Judge.....	June 23.	Brooklyn, N. Y.
32	726	Frank A. Randall.....	Sept, 13.	Ann Harbor, Mich.
33	850	Andrew Ainsworth....	Sept. 16	Greencastle, Ind
34	121	Chas. H. Baker.....	Oct. 26	Baltimore, Md.

There were eighteen (18) delinquent members reinstated during the year, all of whom furnished new health certificates, and paid up "back dues," as required by the Association.

The loss of small remittances through the Mails has been a source of great annoyance to members living at stations where they were unable to procure Postal Money Orders. During the early months of the present year the complaints of this nature were so numerous that it was deemed advisable to investigate, as thoroughly as possible, the cause of such losses. The facts were placed in the hands of a special agent of the Post Office Department in this city, who watched the incoming remittances for several weeks, without discovering the loss of any letters after they reached the General Post Office. It is a noticeable fact, however, that the complaints have been very few since the investigation was made.

It has been discouraging to many, who were compelled to remit twice for the same assessment, and is, doubtless, the cause of many allowing themselves to become delinquent. In cities and large towns, where he members have selected one of their number to act as a local agent, to attend to the collection and forwarding of remittances, there is scarcely ever a delinquent. It is suggested, that if the Executive Committee be authorized to form districts, and appoint a local agent for each district—such agent to receive applications, collect dues and attend to all other matters pertaining to the Association—there would be less liability to loss of remittances, and, consequently, a material reduction of the "Delinquent List."

It is to be regretted that many members change their residences without notifying the Secretary, causing their assessment notices to go astray. This would be obviated by the formation of local districts, as the agent could promptly notify the Secretary of any changes.

W. K. Applebaugh, Sec'y.

INFORMATION WANTED.

Information is wanted as to the whereabouts of Seymour Owen Nichols. He was last heard of in March, 1872, in the employ of the Western Union Telegraph Company, as an operator, at La Salle, Ill. His mother is dead, and his family are very anxious concerning him. Any one having knowledge, however indefinite, which will afford a clue to his present position or condition, will confer a great favor by communicating the same at once to this office.

Western and Southwestern papers please copy.

Notice has been issued in London that the half yearly coupon No. 1, due 1st November next, on the Western Union Telegraph Company's seven per cent. first mortgage building bonds, will be paid at the fixed exchange of 4s. per dollar, equal to £7 per coupon (less income tax), by Messrs. Grant Brothers & Co.

The Eastern Telegraph Company has determined, in consequence of its increasing business, to lay a duplicate cable from Falmouth to Lisbon, connected with either Corunna or Vigo.

RESIGNATION OF VICE-PRESIDENT PALMER.

It is with great regret that we announce the resignation of Judge O. H. Palmer, Vice-President of the Western Union Telegraph Company. For many years Judge Palmer has been prominently identified with the Western Union Company, always filling an office of the highest honor and importance.

Prior to 1862 he was one of the first among the members of the Bar of Monroe County, New York, and was at one time judge of one of the courts in the Western part of the State.

Early in that year he was appointed Colonel of the One Hundred and Eighth Regiment, New York Volunteers, and, in obedience to his patriotic impulses, at once abandoned his lucrative practice and left with his command for the seat of war in Virginia. During his period of service in the army he acquitted himself with much credit, never flinching in the face of danger, and was in command of a brigade on the bloody field of Fredericksburg.

In 1863 he was honorably mustered out of the service and returned to his home at Rochester, only to find his once flourishing business broken up. About this time the melancholy death of Mr. Isaac R. Elwood, Secretary and Treasurer of the Western Union Telegraph Company, rendered that office vacant, and it was tendered to Judge Palmer. Eight years' service in that position has rendered the name of O. H. Palmer one of the best known in the telegraph business in America. He had found his true vocation. The course of his career during this period may be summed up in a few words. It is enough to say that he is one of that band of able men, who, while not actually assisting at the birth of the Western Union Company, yet brought it from a comparatively feeble and obscure state to be what it now is—the best managed and most successful private corporation upon the face of the globe.

In 1871 General Palmer was elected one of the Vice-Presidents of the Western Union Company, and was re-elected in 1872.

He resigns to assume the position of Chief of the Law Bureau of the Mutual Life Insurance Company of the City of New York, a position for which his legal acquirements eminently qualify him, and in which, it is to be hoped, he will find comparative freedom from the incessant care and toil incident to his present duties.

SUBSCRIPTIONS EXPIRED.

We once more call the attention of those whose subscriptions expire with the present issue of the Journal to the fact that unless their subscriptions are renewed the paper will be stopped. Remit at once, and so save us the trouble of forwarding back numbers.

Mr. David Brooks, patentee of the Brooks's Paraffine Insulator, is not going to fail in business for want of advertising. His new advertisement, displayed upon our last page, fully sets forth the merits of his Insulator, which, we are glad to hear, is giving perfect satisfaction to every person using it. That this must be so is evident from the fact that his customers in 1872 number twice that of any previous year.

Attention is called to the advertisement, in this issue, of the Electrical Construction and Maintenance Company of San Francisco. An excellent opening for first-class workmen on telegraphic machinery is there offered.

ATLANTIC CABLE BUSINESS.

The attention of managers of offices is called to the fact that some important changes have occurred in the mode of counting Atlantic Cable business. Also note the fact that the rules which heretofore applied only to Continental business now applies likewise to Great Britain.

Notice the method of counting words where hyphens or apostrophes are used. Also the rate for repeating messages and the rate on cipher business.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

Executive Office,
Western Union Telegraph Company,
145 Broadway, New York,
November 15, 1872.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular.

GENERAL INFORMATION.

Communications relating to checks, or otherwise, with Norwood, N. J., Catskill Mountain House, N. Y., Cornwall, N. Y., Lake George, N. Y., Lake Mahopac, N. Y., Lebanon Springs, N. Y., and Clarendon Springs, Vt., (Summer offices now closed), should be addressed to A. B. Chandler, District Superintendent, 145 Broadway, New York City.

Jacksonville, Ala., closed.
Firebaughs Ferry, Cal., closed.
Mich. Bluffs, Cal., closed.
Moore's Hill, Ind., closed.
Iowa Point, Ks., closed.
St. Francis, Ks., changed to North Robinson, Ks.
Girard, La., closed.
Mittineague, Mass.: Erase P. O. Adds, W. Springfield, Mass.
East Stoughton, Mass., closed.
Marshfield, Mass., closed.
Scituate, Mass., closed.
Messages may be taken for Campell's, Mass., and delivered from Nor[illegible]ridgewater, Mass.; 25 cents for delivery should be colle[illegible]
Linco[illegible] is now a W. U. Office, square 474.
Hal[illegible] Mining Co., O., should read Trumbull Co.
Av[illegible]d.
New [illegible] P. O. A. is Broadway, Union Co.
Cresswel[illegible]egon, closed.
Catawissa, Pa., is now a W. U. Office, square, 84.
McAuley's, Pa., closed.
Ringtown, Pa., closed.
Summit, Schuylkill Co., Pa., closed.
Marion, S. C., closed.

NEW OFFICES.

295 Fort Deposit, Ala.
378 Carr, Ill.
378 Hull's, Ill.
378 New Canton, Ill.
328 Oconee, Ill.
308 Rankin, Ill,
378 Rockport, Ill.
378 Seehorn, Ill.
253 Cold Spring, Ind.
509 Caddo, Ind. Terr.
468 North Forktown, Ind. Terr.
397 Keota, Iowa.
367 Martello, Iowa.
397 Sigourney, Iowa.
465 Highland, Kansas.
475 Meridian, Kansas.
465 North Robinson, Kansas.
375 Hammonds, La.
60 East New Market, Md.
60 Linkwood, Md.
* Weaver, Minn., 100 7 307 Chicago, Ill
Franklin, Nev.
42 West Creek, Ocean Co., N. J.
St. Joseph, Oregon.
140 Millerstown, Butler Co., Pa.
480 Oakwood, Texas.
Deep Creek, Utah.
Toocle City, Utah.
* Benson Landing, Vt., 25 1 39 Whitehall, N. Y., Mont. Co.

Half rate messages may be taken for and received from offices in square 587, (offices in this square were formerly in square 109).

WILLIAM ORTON,
President.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is 6,500. It goes to every State, Territory and Province on the Continent. It is fast becoming a necessity, and is already welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

FOUR DOLLARS FOR FIVE COPIES.

Address—

JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, NOVEMBER 15, 1872.

THE GREAT FIRE AT BOSTON.

The great fire at Boston afforded an opportunity to the employés of this Company to show what activity and intelligence, combined with the resources at their command, can do to mitigate the evils of a great disaster, in furnishing abundant and prompt means of communication. Although the fire interrupted all communication with the principal offices in that city at an early hour on Sunday morning, and the destruction of the prineipal office was so imminent that the office furniture and apparatus were removed for safety, yet telegraphic communication with Boston continued uninterruptedly, the messages being received at and delivered from the various railway stations, at which the Company already had offices. Communications sent to and received from the Atlantic Cables were sent via Portland and Montreal until the temporary interruption at Boston was removed. At an early hour Sunday morning, Gen. Eckert, the General Superintendent of the Eastern Division, came to the main office in this city, and immediately took vigorous measures for reconstructing the lines and offices at Boston. Men and material were promptly dispatched from Portland, White River Junction, New York and other places. A special train left this city for Boston at 7 o'clock with material, and at 9 o'clock a sleeping car containing Gen. Eckert, Manager Brown, Mr. Mackintosh, foreman of repairs, with a corps of line-men and a dozen operators, also started for the scene of disaster.

On Monday morning operations were resumed upon a limited number of wires at the general office in Boston, and during the day all of the wires but two were working from the general and branch offices. In the meantime, there was an immense amount of telegraph business performed by the Company. Over twenty thousand paid messages were sent on Monday from the principal office in this city. All the facilities of the Company were called into requisition for expediting the business. During the past week, Stearns' Duplex Telegraph has been of the greatest value to the Company, and particularly upon the wires between this city and Boston, where four sets are in operation. Previous to the fire but two sets of the Duplex were worked between these points, but on Monday afternoon it became evident that four sets could be used to advantage. As an illustration of the facility with which the means of communication may be multiplied by utilizing this apparatus, a single fact may be mentioned: at 3 o'clock on Monday afternoon, a request was made from Boston that two additional sets of Duplex be forwarded that night—the instruments were promptly packed and sent by Adams Express, and were delivered in Boston at 8 o'clock the next morning. At 9 o'clock the instruments were ready for use. Thus, in the space of eighteen hours, the instruments were transported a distance of 250 miles, put in operation, and two wires were thus practically converted into four. The four sets of Duplex which have been operated between this city and Boston, during the past week, have practically given us four extra wires between these two cities. If the Company possessed Aladdin's wonderful lamp, it is very much to be questioned whether the genii who obeys the mandates of its owner could double these facilities with any more promptness than they were achieved by the use of Mr. Stearns' magical apparatus.

In alluding to the assistance rendered to Boston from this city and elsewhere, we should not forget to mention the earnest, energetic, and intelligent services performed by the company's employés at Boston. Mr. Wood, the Superintendent of the District, and Mr. Milliken, Manager of the Boston office, were early on hand, and rendered most efficient service, as did also Mr. Raymond, foreman of repairs. Superintendent Gates, of White River Junction, and Superintendent Bedlow, of Portland, arrived on Monday morning with gangs of men, and performed valuable services in the reconstruction of the lines. Where all the employés of the Company have done well, it is unnecessary to make especial commendation. In this case every one seemed to have tried to do his best, and the result has been such as to reflect great credit upon the Company.

CLOSE OF VOLUME V.

With the present issue, Volume V. of the JOURNAL OF THE TELEGRAPH is brought to a close.

Originally established mainly as a medium for communicating to the employés of the Western Union Telegraph Company the various orders and regulations necessary to a proper conduct of the service, and, in its infancy, hardly venturing further, the JOURNAL has, from year to year, steadily progressed in all those essentials which render the press leaders in the march of ideas, until now, while still performing the service for which it was established, it stands among the first of the scientific journals of the day.

The attention of the readers of the JOURNAL need scarcely be called to the manifest superiority in contents appertaining to its speciality, over any contemporary in the world. There is no publication in Europe, which, like the JOURNAL, is devoted entirely to the interests and education of the telegraph employé, and certainly none in America approaching it in the real benefit sought to be bestowed upon the telegraphic fraternity. During the past six months the JOURNAL has endeavored to instruct its readers and to render them familiar with the immense strides which electrical science, and the telegraphic art, have taken. To this end no labor nor expense has been withheld, and the result has justified the effort. The evidences of appreciation are not to be mistaken. Subscriptions are pouring in at an unexampled rate. Telegraph operators and others have come to regard the JOURNAL as an essential to their progress, while all classes welcome it as a friend. While so much has been done in the past to make the JOURNAL worthy of the support and appreciation of the large and intelligent class of telegraphists in the United States and British Provinces, we intend that the future shall show a still greater advance in this direction.

We observe, with much gratification, the lively interest shown in the large number of communications daily received from all sections of the country. Many more are promised, some of which will treat upon matters of much interest to the profession. The latent talent existing in the minds of many of our readers is awakened and the fruits thereof will shortly be enjoyed.

The mission of the JOURNAL is not to break up and destroy, where destruction would involve all in common ruin, but rather to enlarge and excite ambition where the fulfilment and gratification of honest and earnest endeavor will result beneficially to all; to none more than to the seeker for knowledge and advancement.

In the journalistic year, which is about to commence, much can be, and will be essayed by the JOURNAL for the general good of the fraternity, but more can be done in this direction by almost any one of its readers than by ourself. There are in the telegraphic ranks of this country many intellects of the first order, who need nothing but an encouraging word and welcome to place their light where it can be seen. This talent we are going to develop, and in its development meet our reward in increased interest and influence in the direction we place the most value—the judgment and reason of our readers.

Pecuniarily, the JOURNAL is owned by the Western Union Telegraph Company, but morally it is the property of the Company's employés. Every article written for, and appearing in its columns appears for their benefit and instruction. Let all therefore recognize this fact, and resolve to assist us in our efforts to retain the present standing and to advance still higher. Such endeavors can have but one result, and that will be—mutual benefit.

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ATLANTIC CABLE.

RULES FOR ATLANTIC CABLE BUSINESS.

To go into effect December 1, 1872.

This order contains complete instructions concerning the treatment of Atlantic Cable Business, and supersedes all previous orders relating thereto.

GENERAL CONDITIONS UPON WHICH MESSAGES ARE ACCEPTED BY THE CABLE COMPANIES.

(1). The Companies owning the Cables to America will not incur or accept any liability whatsoever, either for the due transmission of Telegrams to the Cables, or for their safe delivery at their destination; nor will they accept any liability arising from delay or stoppage by reason of any accident to the Cables or instruments, or from errors caused by indistinct handwriting, nor will they consent to be liable, under any circumstances, for any sum whatever, as damages or otherwise, from loss resulting from errors, mistakes, delays, mis-delivery, non-delivery, or other causes in respect of any message entrusted to them, beyond the return in the case of repeated messages, and under certain circumstances, of the amount paid for transmission.

(2). Messages are classed in three categories :—

1st. Government messages : those which emanate from the Chief of the State, Ministers, Commanders-in-Chief of Land or Sea Forces, and Diplomatic or Consular Agents, and also the replies to such messages.

Messages from Consular Agents, who are engaged in commerce, are not considered as Government messages, except when they are addressed to an official personage and when they relate to official affairs.

Government messages must be properly authenticated by the person who proffers them for transmission.

2nd. Service messages : those which relate to the service of the line.

3rd. Private messages.

Ordinary private messages are those composed of words alone, or words, figures and letters combined, so placed that their meaning is evident to the clerk who accepts them from the sender.

Code messages are composed of words which though not conveying any consecutive meaning can be found in ordinary dictionaries or gazetteers.

Figures may be used in code messages if the sender can show that they have not a secret meaning.

Cipher messages are composed either wholly or partly of figures or letters, or of a combination of words and figures, words and letters, or words, figures and letters, constructed for the purpose of concealing the meaning and intention of the sender, or of words not to be found in dictionaries or gazetteers.

Any message containing such combinations, either wholly or in part, will be treated as a cipher message and charged as such.

Messages may be forwarded in any language in which Roman characters are employed.

GENERAL INSTRUCTIONS FOR CHARGING AND COUNTING MESSAGES.

(3). *All Messages to be Prepaid by the Sender.*—The "word system of charging" has been adopted for messages originating in the United States, British Columbia, Canada East and West, Newfoundland, Nova Scotia, New Brunswick, Prince Edward's Island, and Cape Breton, and destined to Great Britain and Ireland.

A single message between the above places may contain any number of words at the option of the sender, who will be charged "by the word" at the ordinary tariff price for the time being.

The Companies do not insist upon the insertion, either of the "*name from*" or the "*place from*" in messages to Great Britain and Ireland, but should complications arise with Receivers, on account of the omission of those words, the Companies decline to make any unpaid enquiries respecting them. The "place from" must be inserted and paid for throughout in messages to points *beyond* Great Britain and Ireland; and to points in India and beyond, the sender's signature is also required.

(4). The maximum length of a word is fixed at seven syllables ; any excess is counted as a word.

Words joined by a hyphen are counted as so many separate words.

Words separated by an apostrophe are counted as so many separate words.

Proper names of persons, names of places, squares, streets, &c., titles, Christian names, particles, and qualifications, are counted for the number of words employed by the sender to express them.

Names, such as Dezeug, Delarue, Vonhoffman, if written together count as *one* word, if written separately as De Zeug, De la Rue, Von Hoffman, they are reckoned and charged as separate words.

F. O. B. and *C, F, I.*, when written as separate letters, are each counted as Three words, but when written "*fob*," "*cfi*" as One word.

Twopence, threepence, up to elevenpence, written as a single word, count as One word in each case.

Names of countries, principalities, states, islands, cities and towns, if written as one word, count as One word. For instance, *Novascotia*, *Southcarolina*, *Princeedwards*, *Newyork*, count in each case as One word only ; if written separately, or divided by a hyphen, they count as separate words.

In case it is not certain that a combination of words employed by the sender is contrary to the usage of the language, the sender's manner of writing regulates the counting.

Numbers expressed in figures are counted at the rate of five figures to a word, plus one word for any excess. The same rule applies in counting groups of letters.

Every separate character, whether letter or figure, is counted as a word. The same applies to an underline.

Initials before surnames are considered as separate letters, and each one is counted as a word.

Signs of punctuation, hyphens, apostrophes, inverted commas, parentheses, fresh paragraphs, are not counted.

Decimal points, commas, and bars of division used in the formation of numbers are each counted as a figure.

Letters added to figures to form ordinal numbers are each counted as a figure, thus, 129th is counted as five figures, or one word.

The following examples, the principal of which have been extracted from the Convention of Rome, determine the interpretation of the rules to be followed in counting words and figure quotations in messages which are expressed in plain language :—

Irresponsibility (7 syllables)	1	word.
Unconstitutionality (8 syllables)	2	words.
Aujourdhui (without an apostrophe)	1	"
Today (without hyphen)	1	"
C'est-à-dire	4	"
That's to say	4	"
J'ai	2	"
I've	2	"
Aix-la-Chapelle	3	"
Weston-Super-Mare	3	"
Aixlachapelle	1	"
Westonsupermare	1	"
Newyork	1	"
New-York	2	"
New South Wales	3	"
Newsouthwales	1	"
De la rue	3	"
Delarue	1	"
Du Bois	2	"
Dubois	1	"
De Lygne	2	"
Delygne	1	"
44½ (5 figures and signs)	1	"
444½ (6 figures and signs)	2	"
444,5 (5 " " ")	1	"
444,56 (6 " " ")	2	"
10 francs 50 centimes, or 10fr 50c	4	"
10 pounds 10 shillings / £10 10s.	4	"
10fr 50	3	"
£10 10	3	"
fr 10,50	2	"
11hr 30	3	"
11,30	1	"
£10,10	2	"
Rs 793,8	2	"
11 R 10	3	"
11,10	1	"
The 17th	2	"
The 1529th	3	"
44 2 (for [illegible] shillings 2 pence*)	3	"
5, [illegible] (4)	1	"
3 4 meaning 3 farthings)	2	"
2[illegible]	2	"
2 p. [illegible]	3	"
Deux cent trente quatre	4	"
Zweihundert [illegible] grunddreizig	1	"
Duecentotrentaquattro	1	"
Two [illegible] and thirty four	5	"
Tw[illegible]ord vierendertig	2	"
[illegible]	1	"
E. M. [illegible]	2	"
Emvt (‡)	1	"
Tmrlzk (‡)	2	"
The matter is urgent ; leave at once. (7 words and 2 underlines)	9	"

(*) The oblique stroke meaning shilling is considered and transmitted as *s*, on the European lines.

(†) If an oblique stroke is used to divide a group of figures which does *not* mean shilling, then it counts as a figure.

‡ Illustrations of the manner of counting groups of or continuous letters in messages.

Cypher Messages.

(5.) In messages containing secret language the address, signature, and portions of the text expressed in ordinary language, or in words of preconcerted meaning, are counted in conformity with the preceding article, and are added to the number of words found in the cypher text.

The portions of the text composed either of figures, or secret letters, or of a language inadmissible under Article 2, are counted as follows :

All the characters, figures, letters or signs are added together. The total is divided by five, and the quotient (plus one for the remainder if there be any) gives the number of words to be charged for. The signs which separate the groups are counted unless the sender expressly requests that they be not transmitted.

The charge for such message is the same as for a "repeated message."

Delivery of Messages at their Destination.

(6.) Messages should be addressed either to the residence or place of business of the receiver ; they may also be addressed to the Post Office or Telegraph Office till called for.

Messages addressed to the residence or place of business of the receiver, or to the Post Office or Telegraph Office till called for, at places beyond the limits

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of foot delivery, are at once despatched to their destination, either by post or (if the sender desires) by a more rapid means of conveyance, if available.

The charge for delivery by express (man and horse) is $3.13 for every five miles (English) or fraction of five miles; this charge must either be prepaid, or payment must be guaranteed by the sender. The words "Express from . . . ." must be inserted immediately after the receiver's address, and will be charged for.

If on account of insufficiency or incorrectness of address, absence or refusal of receiver to accept a message, the expenses incurred in delivering it by Express cannot be obtained, they must be paid by the sender.

The sender is responsible for an incorrect or insufficient address; corrections and alterations can only be made by a fresh message, which must be paid for.

Paid Service Messages.

(7.) Every message forwarded by or at the request of the sender or receiver, to rectify or complete a message already in transit, and generally every communication exchanged with a telegraph office relative to a despatch transmitted or in course of transmission, and also the replies to such messages, will be charged for at full rates. The sender or receiver of a message, can have any passage or passages in his message corrected, which may appear to him doubtful, provided his application for such correction be made within twenty-four hours after the departure or arrival of the message respectively.

The charge for this service is as follows:

If the sender makes the application, he must be charged the price of a message calculated according to the length of the passage to be corrected, and he must also deposit the price of a message of ten words, in payment of the service message returned to announce that the correction has been made.

If the receiver makes the application, he must be charged the price of a message necessary to ask for the correction, and also the price of an answer, calculated according to the length of the passage to be corrected.

These charges will be refunded to the person who paid them, if it be found upon receipt of the repetition, that the Telegraph Service has been in fault.

No return of charges will be made upon the original message, corrected by a paid service message.

Prepaid Replies.

(8). Replies at full rates can be prepaid, the sender determining the number of words, and inserting, and paying for the following words immediately after the receiver's address. "*Reply words paid.*"

Replies must not contain more words than the number paid for by the sender at the original station.

Should the reply contain more than the number of words specified and paid for, the sender of the reply must pay for it as a fresh message, at the ordinary tariff rates; and in such cases the amount deposited for the reply by the sender of the original message will be refunded to him, if it is ascertained on investigation at headquarters, that the reply is fully paid for by the sender thereof.

If the original message cannot be delivered, or if the receiver formally refuses to send a reply, the delivery station will inform the sender of it, by a telegram which takes the place of a reply.

This telegram will indicate the cause of non-delivery, and, when requisite, will give the information necessary to enable the sender to order his message to follow the addressee.

Prepaid replies must be tendered not later than eight days after the date of arrival at the delivery station. Should they be presented *after* the expiration of eight days they must be paid for as ordinary messages.

Amounts deposited to prepay replies must be entered in account, and remitted as a part of the tariff upon the original message; and must not, under any circumstances, be refunded without instructions from headquarters.

Messages to which a reply is prepaid must not only contain the words, "Reply, —— words, paid," as a part of the message, but *must show in the check* the amount thus prepaid. For example: A message of ten words, from Virginia to London, to which a ten word reply is prepaid, must be checked thus: "10 paid, $11.50, and $11.50 for reply."

Replies which have been prepaid, must be checked in the following manner: "10 collect, $11.50—prepaid reply to No. —— of 28th."

Repeated Messages.

(9.) The sender of an ordinary private, or code message, if he desires, may have it repeated, in which case the various offices en route repeat it to each other as it passes.

The charge for repetition is equal to *half* the charge of the message, in addition to the ordinary tariff rates paid for its transmission.

The words "*Repetition Paid.*" must be inserted immediately after the address, and will be charged for.

Repetition at the foregoing rates is compulsory for cipher messages.

Acknowledgment of Receipt.

(10.) The sender of any message may request that a notice of the time, at which it is delivered, be transmitted to him by telegraph.

If the message cannot be delivered, the terminal station informs the original sending station of it, by a notice containing, if requisite, the information necessary to enable the sender to cause his message to reach its destination. When there is no telegraphic error to be corrected, this notice takes the place of the acknowledgment of receipt.

The sender can have the acknowledgment of receipt addressed to him at any point of the territory of the Contracting States on furnishing the necessary instructions.

The charge for an acknowledgement of receipt is equal to that of a message containing ten words.

The words "acknowledgment paid" must be inserted immediately after the receiver's address, and will be charged for.

Government Messages.

(11.) American, English and French Government messages will be charged half rates between New York and Great Britain or France; that is—messages in plain language, will be charged half ordinary public rates, and messages in cypher, half cypher rates. Beyond New York and beyond Great Britain and France, full rates must be charged.

Messages of other Governments will be charged full rates.

Characters.

Note the following characters used by the Cable Companies:

For a horizontal dash, ——— - - - - ———

For a perpendicular dash, - - ——— ———

Complaints.

(12.) All complaints respecting irregularity in the transmission or delivery of messages must be made by the *Sender* only, and addressed to the administration or Company to which the messages are handed.

The charges made for messages will be returned under the following circumstances:—

1st. The total charge of any message which has failed to reach its destination, or which has been seriously delayed through the fault of the Telegraph service.

2nd. The total charge for any *repeated message* which, on account of errors in transmission, has manifestly failed to attain the object the sender had in view.

3d. In case of interruption to a submarine line the sender of a message has a right to the return of the charges accruing to that portion of the route which, on account of the interruption, has *not* been traversed, after deduction has been made of the expenses incurred in forwarding the message by the best means possible to its destination.

4th. Complaints made by senders must be accompanied—

1st. By a declaration in writing from the Receiving Station, or the receiver, if the message has not been delivered.

2d. The receiver's copy of the message, if it has been mutilated or seriously delayed.

5th. The sender of a message, who does not reside in the country from which it was forwarded, may present his application at the office of origin, *through* the intervention of another office; in which case, should the application be entertained, the sender will receive his money back from the office to which he has made his application.

6th. In case of delay, the sender has an absolute right to the reimbursement of the charges, in the event of his message not arriving at its destination sooner than it could have been sent by post.

7th. Every claim should be made under penalty of rejection, within *six months* of the date of the message.

Managers are specially instructed that all claims for refunding of tolls on cable messages, must be forwarded to the Secretary, at New York, with statement of complaint, as above. The tolls will in no case be refunded, without instructions from headquarters.

(13.) Messages destined to points beyond Great Britain and Ireland, are forwarded by the cheapest route, unless specially directed by any other. When there is more than one route to the same place at the same charge, and messages are not specially directed, they are forwarded by the best route at the discretion of the Telegraph Officials. The indication of route is charged between America and London or France. Beyond London and France it goes free. Messages destined for places to which there is no telegraph communication, must contain the name of the place from which they are to be posted. The charge for postage is 37 cents."

(14.) *Check.*—You will state in the cheek:

1. The number of words in the entire message, including address, date and signature.

2. The amount charged.

Count.—The address, signature and date (if message is dated) must be included in the count and charged for.

Should the sender omit the "place from," It must be sent with the check.

In addition to the above we are notified that the route *via* Russia to Hong Kong and Shanghai is again open, the rate from London to Shanghai and Niagasak by that route being $21.50 for twenty words; half rate for every ten or fraction of ten additional words.

ATLANTIC CABLE BUSINESS

Will *not* be included in the regular monthly Account Current and Check Report. Keep an entirely distinct and separate record thereof, and at the end of each month forward promptly to the Auditor at New York.

First. A detailed statement of Sent Business, showing date, address and signature of each message, number of words, and amount collected.

Second. A detailed statement of Received Business, giving same data, omitting amount.

Third. The original of all messages sent, *and copies of all messages received.*

CUBA CABLE BUSINESS

Must be kept in the same manner as the foregoing, but separate from Atlantic Cable Business.

REMITTANCES.

Remit weekly to the Treasurer at New York the entire amount of gold collected, with written statement showing how much for Atlantic Cable, how much for Cuba Cable, with dates of messages.

The tariff to Greece and St. Maurice, via Corfu, was incorrectly given in last Journal. Greece via Corfu should read 334 St. Maurice, via Corfu, 358.

WILLIAM ORTON.
President.

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JOURNAL

OF THE

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JOURNAL OF THE TELEGRAPH.

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THE ELECTRICAL DOUBLER.

The purpose of the Electrical Doubler is to increase the least conceivable quantity of electricity by continually doubling it, until it becomes perceptible upon a common electrometer or made visible in sparks.

The principle involved in the construction of the Doubler will be best understood by explaining the first device of this kind, invented by Mr. Bennet. This apparatus consisted of a circular brass plate three or four inches in diameter, polished and thinly varnished on the upper surface, upon which was placed another brass plate of equal diameter, polished and varnished on both sides, with an insulated handle attached to one edge of it. A third plate was also provided, of equal diameter, polished and varnished on the under side, and with a perpendicular insulating handle extending from the centre of the upper side. Its mode of operation is as follows:

Electricity is communicated to the under side of the first plate and the second plate is touched with the finger. The second plate is then removed from the first by its insulating handle and the third plate

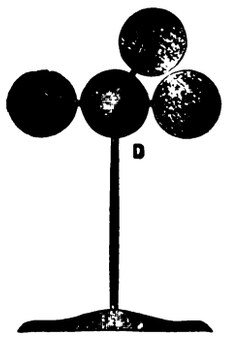


Fig. 1.

is placed upon the second. The third plate is then touched by the finger and then separated from the second. In this situation it will be apparent that two of the plates are charged with one kind of electricity, and of nearly equal quantity, and one of the plates with the other kind of electricity. The third plate is now touched to the under surface of the first plate, the first plate being covered by the second, and the second plate is touched by the finger. If now the third plate is removed, and the finger withdrawn from the second plate and the latter is lifted up from the first plate, the electricity becomes doubled. This process may be repeated ten or twenty times, and by doubling the quantity of electricity every time the smallest conceivable amount can be made visible, since at the twentieth operation it is increased 500,000 times.

In order to avoid the labor of the preceding operation, Dr. Darwin invented the movable doubler, consisting of four metallic plates moved by wheel works, but requiring to be touched by the hand in order to produce the effect. This apparatus has been superseded by Nicholson's Revolving Doubler, which is represented by figures 1 and 2. The instrument is supported on a glass pillar 6½ inches long, and consists of two fixed plates of brass, A, C, two inches in diameter, separately insulated and placed in the same plane, so that a revolving plate, B, may pass near them without touching. A brass ball, D, two inches in diameter, is fixed on the end of the axis that carries the plate, B, and is loaded within at one side to act as a counterpoise to the revolving plate B, so as to keep it at rest in any position. The axis, P, O, is made of varnished glass, and so are axes that join the three plates with the brass piece M, which supports the plates A and C. At one extremity of this axis is the ball D, and the other is connected with a rod of glass N O upon which the handle L is fixed, and also the piece G H separately insulated. The pins E, F rise out of the back of the fixed plates A, C, at unequal distances from the axis. The piece K is parallel to G H, and both of them have their ends armed with small pieces of steel wire that they may touch the pins E, F in certain points of their revolution. In the piece M, there is fixed a pin I, which intercepts a small wire proceeding from the revolving plate B.

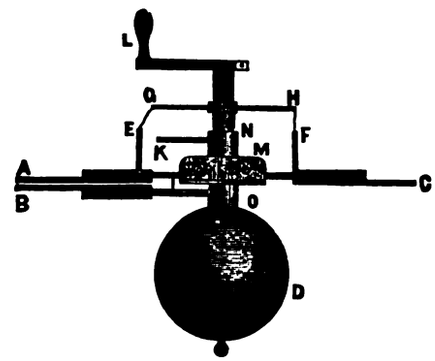


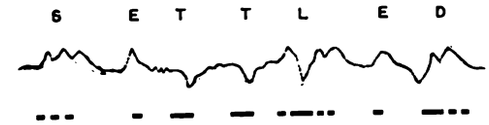
Fig. 2.

These wires are so adjusted by bending that when the plate B is exactly opposite to D, the piece G-H connects the two fixed plates while the wire and pin at I form a connection between the ball D and the plate B. On the contrary, when the plate B is exactly opposite to the plate C, the ball D becomes connected with C by the contact of F with the wire at K, the plates A and B being then completely unconnected with any other part of the apparatus. In all other positions the three plates and the ball will be perfectly unconnected with each other.

THOMSON'S SYPHON RECORDER.

The accompanying cut is a *fac similie* of a portion of a message received over one of the Atlantic cables, and recorded upon a ribbon of paper by Thomson's Syphon Recorder. The signals are similar to those made by the Refracting Galvanometer. The alphabet employed is the same as that used upon all the Morse, Needle and bell telegraphs in Europe, and is similar to that of the Morse Alphabet. When used in connection with the Mirror Galvanometer, where a spot of light is thrown from a mirror upon a shaded screen, a movement of a spot of light to the left indicates a dot and a movement to the right a dash. When recorded upon paper by Thomson's Syphon Recorder the upper points represent dots and the lower points lines.

The Syphon Recorder consists of a movable coil of very fine wire, suspended between the poles of a powerful horse-shoe magnet, a syphon of extremely thin glass tube, machinery for moving a band of paper, an insulated vessel filled with common ink, and an electric doubler. The insulated vessel filled with common ink is placed in front of the coil. One end of the syphon dips into the vessel filled with ink, while the other end of the syphon is bent horizontally and faces the paper ribbon. The syphon is so arranged as to be free to move in a direction at right angles to the length of the paper, and consequently if the ink is caused to issue from the syphon with sufficient force a line will be traced upon the ribbon, and if the syphon itself is moved from side to side angular lines will be made across the paper. If alternate positive and negative signals are sent through the cable the coil will be deflected from side to side, and will move the syphon by means of a



thread connecting them. The ribbon of paper being drawn forward by clock work, the movements of the coil will be recorded on the paper. The spurting of the ink is necessary for the purpose of avoiding friction on the surface of the paper, and is effected by electrical repulsion, the ink vessel being charged to a high potential by means of an electrical doubler driven by an electrical magnetic engine.

GOVERNMENT monopoly of the telegraph receives the following quietus in the columns of the New York *Commercial Chronicle:*

"Telegraphs, like railroads, must be left to private enterprise. These great public enterprises require trained men, not political wire-pullers, to manage them with economy and success. Sixty thousand officials are, it is said, appointed by the Government now, and the nation cannot consent to make the number seventy thousand. We trust the mischievous scheme will not be pushed in Congress. The leading newspapers will not venture to brave the almost of public obloquy which would certainly be awakened by such an attempt to enlarge the means and temptations to political corruption. It is true that governments abroad own telegraphs. But that is nothing to the purpose. Foreign Governments do many things which we cannot, dare not, must not do—things that require a centralization of power, and are incompatible with our freer institutions."

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ON THE CONSTRUCTION AND SUBMERSION OF SUBMARINE TELEGRAPH CABLES.

By Professor Fleeming Jenkin, C.E., F R.S., &c.

All submarine cables hitherto laid have consisted of three parts: 1. The conducting wire, generally, if not universally, copper. 2. The insulator surrounding the conductor, generally gutta percha, or some preparation of india rubber. 3. An outer covering intended to afford protection, and give longitudinal strength. The simplest form of outer covering consists of iron wires laid helically over a jute or hemp serving.

Conductor—Copper, being the metal which offers less resistance to the passage of the current than any other commercially available, is employed in all but a few exceptional cases. The earliest cables had conductors formed of a solid wire, which has the advantage of occupying less bulk than any strand, and so requiring less insulating material to give the same thickness of coating. This advantage was more than counterbalanced by the brittleness of the solid core, which breaks after being bent a few times, and from this cause frequently caused total interruption of telegraphic communication. A strand of 3 or 7 wires is therefore now universally used. Messrs. Clark and Bright introduced a strand made of wires of such section as to fit into one another, building a truly circular rope, and thus endeavored to combine the advantage of the strand and solid wire. Many have been unable to carry this plan to any commercial advantage. The strength of copper wire is given in some books as equal to 60,000 lbs. per square inch, but the one used in submarine cables is chosen rather for electrical than mechanical properties, and will bear only from 35,000 to 39,000 lbs. per square inch. It elongates from 10 to 15 per cent., or even more, before breaking, so that its full strength cannot be made use of; but this extensibility is a very valuable property, since it ensures that the conductor shall not break before the full strength of the protecting cover has been made use of and overcome. A copper strand will bear 1¼ lb. per pound weight per knot before breaking. It will stretch 1 per cent. with 1 lb., and will not stretch sensibly with a weight of 0.75 lbs. per pound per knot.

Thus a strand weighing 300 lbs. per knot, such as was used for the Anglo-American cables, will rarely carry 450 lbs., will stretch 1 per cent. with 300 lbs., and will not stretch sensibly with 250 lbs.

The weight per nautical mile (6087 ft.) of copper wire of diameter d expressed in thousandths of an inch is $\frac{d^2}{55}$; and if the conductor be a strand, the the weight is $\frac{d^2}{70.4}$.

Great care is necessary in making the joint between two portions of the conductor. A scarf joint is first made by soldering together two tapered and fitted ends. Fine copper wire is wrapped round this joint, which is somewhat inflexible, and solder run round the wire. A second wrapping of fine wire is then given, and left without solder. The solder must be applied with resin, and not with spirits of salt.

The joint is necessarily less extensible and more brittle than the rest of the conductor, but if from any cause the soldered joint is broken and stretched so as to open, the fine wire maintains perfect electrical connection, being simply pulled out like a helical spring. The following is a Table of the relative electrical resistance of some metals and alloys at 0° centigrade showing the advantage of employing copper.

(Equal length and diameter.)

Silver	1
Copper	1
Gold	1.28
Iron	5.94
Tin	8.09
Lead	12.02
Brass	4.5
German silver	12.82
Mercury	58.15

Insulator.—Even the best insulator, such as glass and gutta-percha, do conduct to some extent, but if we were to express these resistances so as to form a construction of the last table, we should find for gutta-percha

About 60,000,000,000,000,000,000, or 6 by 10^{19}
And for glass ... ... 6 by 10^{26}

India-rubber has a somewhat higher resistance than gutta-percha, and different preparations differ considerably in their resistances.

India-rubber has been applied in many ways to the conductor. Most commonly tapes of masticated or bottle rubber are wrapped round and round the conductor until the required thickness is obtained. These tubes used to be gummed together by solvents, but this plan was found to cause decay, and has been abandoned. Simple heat has also been applied unsuccessfully, the india-rubber so heated becomes tacky. Mr. Siemens applied the tubes longitudinally, and simply pressed the freshly cut edges together. This did not make a safe joint. Some manufacturers vulcanized the india-rubber, but the material thus formed, although quite homogeneous, absorbed water, was subject to decay, and allowed free sulphur to reach the copper wire. Mr. Hooper's method of applied india-rubber has been the most successful; he covers the conductor with tapes of pure india-rubber next the copper, following by a coating of oxide of zinc and india rubber, which he calls a separator. The separator is enclosed in a jacket of vulcanized india-rubber. In the process of baking the core to vulcanize the jacket, a little sulphur passes the separator and slightly vulcanises the pure rubber, which is welded into a perfectly homogeneous mass; the core during this process is heated to 250° Fahr. and baked for four hours; it does not become tacky, and is remarkably compact and durable. The joints between two lengths of the insulated core are made with the same materials, and are baked for two hours in a steam jacket. This is the only application of india-rubber which has been thoroughly successful for submarine cables.

Gutta percha is more easily applied, and its use has been attended with almost invariable success; it is pressed out while warm and plastic through a die round the conductor; several successive coatings or tubes are thus applied till the desired thickness is attained. The first coating is attached to the strand by what is termed Chatterton's compound, being a sort of mastic composed of 1 part by weight of Stockholm tar, 1 part of resin, and 3 parts of gutta percha. This compound is also used to fill the interstices in the strand and to attach the successive layers of gutta percha on to the other.

Gutta percha will bear about 3.500 lb. per square inch of section, but owing to its great extensibility it does not add more than about one-third of its strength to the copper strand. It will stretch 50 to 60 per cent. before breaking, and will bear an astonishing amount of ill-usage, such as knotting, squeezing, or stretching, but is easily pierced by a nail or similar sharp tool, or cut by a knife. It becomes soft at the temperature of about 100° Fahr., and after manufacture should never be subjected to a higher temperature than 90° Fahr. The joints are made by heating the two ends of the covered conductor after the copper has been joined, and applying by hand successive coatings of warmed and plastic gutta percha, the separate layers of which are also cemented by Chatterton's compound. Much skill and extreme cleanliness are required in making these joints, which were a frequent cause of failure in early cables. If the gutta percha be either overheated or under-heated, the junction effected is not permanent, the gutta-percha at the joints becomes hard and brittle and shrinks back from the gutta percha of the core, leaving a very visible gap which destroys the insulation. The process is now thoroughly understood, but each joint is made under inspection and subjected to strict electrical tests after completion. When dry and exposed to light, gutta percha very rapidly decays, becoming brittle and porous, but under water it appears to undergo no change whatever. The writer has had great experience and does not know of one instance in which gutta percha has decayed under water. The electric and mechanical properties of the cores of his cables first laid down twenty years ago are as good as ever. The experience with india-rubber is totally opposed to this. All forms except Mr. Hooper's rapidly change under water. Mr. Hooper's appears hardly so absolutely permanent as gutta percha, but the change observed does not appear to be material. Hooper's india-rubber will bear much greater exposure to heat than gutta percha, and is much more permanent in dry places. Both gutta percha and Hooper's india-rubber absorb some water, but not to such an extent as to be mischievous. Some forms of india-rubber are rendered unfit for use by this absorption, which in pure india-rubber is such that the material absorbs 25 per cent. of its own weight of fresh water.

The completed core has considerable strength. The Anglo-American cables have a core with 300 lb. of copper and 400 lb. of gutta percha, and this bears without injury ¼ ton quite unassisted by the outer covering; it will stretch ten per cent. under this weight, and may afterwards be knotted and squeezed without any electrical injury being done. Before the application of Chatterton's compound the copper wire used, after a strain had come on the core, to allow the gutta percha to slip back over it without itself returning to its original length. This forced the copper to buckle, and in some cases brought it through the gutta percha. This can no longer occur. The dimensions of the core are determined by the number of words per minute required to be transmitted, and by the total length of the cable. With gutta percha cores the ratio of copper to gutta percha in pounds weight per knot varies from equality to two-thirds. The smallest core practically used has 73 lb. of copper and 119 lb of gutta percha per knot; a more common size is 10 lb. copper and 150 lb. gutta percha. The largest size yet adopted is 400 lb. copper and 400 lb. gutta percha for the French Atlantic.

The number of words which a core will transmit is inversely proportional to the square of the length, and when a constant ratio is maintained between the weights of the insulator and conductor, it is simply proportional to the weight of the core per knot. Let n be the number of words per minute which a cable of the length L in nautical miles will transmit with a mirror instrument. Let w be the weight of copper per knot, then,

$$n = \frac{C}{L^2 w}$$

where C is a co-efficient varying for the different

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ratio between the gutta percha and copper. The following Table gives the value of C for several ratios:

Copper	100	100	100	100	100	100	100	100	100
Gutta percha	80	90	100	110	120	130	140	150	160
Value of C	163,000	175,000	187,000	196,000	205,000	21,500	22,400	23,300	24,000

If the Morse instrument be used, divide the value of n thus obtained by 14.

If Willoughby Smith's improved gutta percha is used, multiply n in either case by 1.17. This latter value will be correct for Hooper's material also.

Thus a core of 100 lb. copper and 120 gutter percha will transmit 20½ words with the mirror and rather less than 1½ words per minute with a Morse instrument; If Hooper's material or Willoughby Smith's improved core are used, the speeds would be 24 words and 1.7 respectively.

The Morse is restricted to short lengths of cable, thus 250 miles of the above core would transmit by Morse, twenty-seven words per minute, or as much as a clerk can conveniently send by hand; the mirror can be read at much more than 30 words per minute; but Sir William Thompson's new recording instrument will receive as fast as the mirror, and leaves a permanent writing which can be read at leisure; with this instrument as much as 120 words per minute may be read if the core will allow it.

Outer Covering.—The core is served with hemp or jute applied wet, and either tanned or saturated with brine; originally the hemp had been tarred, but the tar tended to prevent the discovery of faults, sealing up any small apertuare temporarily. Sometimes for cables of moderate length several cores 3, 4, or even 7, were laid up together so as to form into strands of hemp, called worming, a circular rope, which was served like the single core into hemp or jute. These multiple cables of course transmitted indepedent messages through each core. The served core is commonly protected in cables intended for moderate depths by a sheathing of iron wires laid round in a long helix, so as to give the cable the appearance of an ordinary iron rope. The tube which the wires so laid on form cannot diminish in diameter, and hence stretches very little more under a given strain than an iron rod of the same weight per knot would do. The diminution of diameter is prevented by the abutment of each wire against its neighbor, so that the soft heart of the cable undergoes no compression. If the wires are laid on with equal tension, the strength of the completed cable is equal to the sum of the strength of the wires which compose it. In the spinning or closing machines, as they are called, the wire is wound on bobbins which as they revolve round the axis through which the core passes remain parallel, to themselves, so as not to put a twist in the wire.

A cable so formed is not spongy, and has little liability to kink, that is, to throw itself into a loop when leaving the hold of the ship in which it is coiled. The elongation of an ordinary iron covered cable with half the breaking weight varies from about 0.5 to 1 per cent., an amount which can never injure the core. While being laid the cable generally untwists slightly, but the elongation from this cause also is insignificant.

The iron wire is protected from rust by being galvanized, and still further by being covered with hemp or jute, and a compound of asphalte and silica.

A cable covered with good iron should bear 2 tons per pound of iron wire per fathom.

Thus a cable with 3,750 lb. of iron per knot should bear 7½ tons. This corresponds to an intensity of stress equal to about 41 tons per square inch. The larger gauges and inferior qualities of iron will not bear this. The following table shows practically the weights borne by wire supplied by Messrs. Johnson, of Manchester.

B. W. G.	Breaking strains.	Weights per knot. cwt.
00	2067	20.59
0	1716	16.47
1	1393	12.02
2	1212	11.49
3	1048	9.55
4	873	8.06
5	749	6.90
6	622	5.86
7	530	4.61
8	449	3.86
9	369	3.12
10	306	2.55
11	242	2.05
12	184	1.68
13	144	1.28
14	109	0.98
15	86	0.73
16	66	0.59
17	51	
18	39	

The smallest number of wires ever used is 9, and this makes too stiff a rope.

Eighteen is a very large number.

Twelve makes a good rope

A large size of wire is used for shore ends, to protect the cable against anchors, attrition and rust; for this purpose, cables of from 10 to 20 tons per knot are used. The largest size is generally covered with 10 or 12 strands, each spun of three galvanized iron wires. A cable so made is much more flexible and easily handled than one covered with solid wires.

Cables covered with ordinary iron are hardly strong enough to resist the strains to which they are exposed while being laid in depths above 1,500 fathoms; above this, homogeneous iron wires (really a variety of steel) are employed. This material will bear from 50 to 60 tons per square inch. The Malta and Alexandria cable is an example, which differs in nothing from the shallow water cable except in the substitution of homogeneous iron for ordinary iron.

The main cable between St. Pierre and the United States is a good example of this type.

Core copper, 7 wire strand, weighing per knot	107 lbs.
Gutta percha and compound	150
Jute yarn serving	
Outer covering 10 B. B., galvanized	
Iron wires 0.165 in. diameter, weighing per knot	4,254

Outer Protection.—For still greater depths, recourse is had to a more complex type of cable. Each steel wire is enclosed in a serving of hemp or manilla, the strength of which may be added to that of the steel in calculating the strength of the cable, while the serving adds nothing to the weight of the cable in water. The elasticity of a straight hempen fibre is less than that of most steel, but by choosing the lay of the hemp strands properly, the hemp or steel may be made to stretch so evenly as to give way together, and then the strength of the served wire or cable is found to be actually greater than the sum of the strengths of the compound parts; each part breaks at its weakest point, but these weak points never all occur at the same point in the compound cable, so that we obtain for the strength of the cable the sum of the average strengths of the parts, which is, of course, greater than the sum of the weakest parts.

The Atlantic and most other deep sea cables are of this type. The following are the weights of the materials used per knot in the French-Atlantic Cable:

	Diam.	Inches.	Breaking strain.
Copper, 400 lbs. per knot		0.168	644
G. P., 400 lbs. per knot		.463	
Serving, 234 lbs. per knot		.669	
Homogenerous wires (10)	1,589	.1	950
Manilla strands (50)	1,091		550
Each served wire	2,680	.245	1,550
Cable	3,701	1.134	16,530
Weight of cable in air	1.652 tons per knot.		
Weight of cable in water	0.753	"	
Strength in tons	7⅜ tons.		

The completed cable is coiled in the works, and on board ship in large circular tanks with eyes from 6 to 8 feet diameter. On board the Great Eastern the largest tank was 75 ft. diameter, and 16 ft. 6 in. deep, holding 1,100 knots of cable. The diameter of the tank depends on the beam of the ship. One twist per turn is necessarily put into the cable as it is coiled away. This twist as necessarily comes out when the cable runs up out of the tank. In fact, the one operation is exactly the reverse of the other, and leaves the cable as it came from the spinning machine. The cable as it runs up from the tank is led to the centre, and confined to the centre by large wrought-iron horizontal rings, which prevent the line from lashing out under the influences of centrifugal force.

From the tank it runs in troughs to the brake drum, round which it takes four or five turns. This drum is prevented from turning freely by a break strap, which thus puts the necessary retarding strain on the cable.

It is essential that the restraining friction should be constant, a result obtained by the Appold break. In this arrangement both ends of the break straps are attached to one lever in such a manner that when the break begins to turn it tends to lift the lever and weight hanging from it, and as the lever is lifted it slackens the break strap, until the difference of tension on the two ends of the strap is equal to the weight hanging on the lever. When this is the case, the lever is no longer lifted, but remains stationary with the strap, allowing the drum to turn, restrained by a constant friction equal to the weight on the lever (reduced to the point where the strap is attached). If the co-efficient of friction increases, the lever will be a little more lifted, and the strap slackened; if the co-efficient of friction diminishes, the lever and weight will fall, tightening the strap; but in any case the retarding force will be simply equal to the weight. After passing the break drum the cable dips under a weighted pulley, which rides suspended on a V of taut cable. If the strain increases, the rope tightens and raises the pulley; if the strain diminishes, the weight and pulley fall. Thus the height of the pulley indicates the strain. This instrument is called the dynamometer. Lastly, the cable passes over the pulley into the sea.

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THE GOVERNMENT AND THE TELEGRAPH.

[From the Chicago Tribune.]

Washington advices agree that there will be another effort this winter, more vigorous than any previous one, to invest the Government with the telegraph business of this country; that the Postmaster-General will reiterate his recommendations of the project in his forthcoming report; and there is an impression that the President will favor it in his message. The public objections to this scheme are so numerous and grave that they cannot be repeated too often.

1. The purchase of the telegraph lines by the Government would establish a precedent for further centralization of power that would be without limit. The same specious arguments that suggest it would be brought forward in due time to warrant Government control of the railroads, the express business, the steamboats, the stages, and all other common carriers. This has been the case in Prussia and some other European countries where the first step has been taken. It would be impossible to fortell where the Government assumption of private business would end, short of national bankruptcy.

2. The Government cannot accomplish the results which are promised in this matter. It is simply impossible, with our complicated, heterogeneous, and corrupt Civil Service system, to transact, promptly and accurately, the telegraph business over the enormous area of our territory. The difficulties that the Government still encounters in the working of the slower machinery of the mails, is a sufficient warning that it would be utterly incompetent to manage the more delicate and exacting business of telegraphing.

3. The Government would not hold itself responsible for any damage to private interests resulting from the tardy or inaccurate administration of the telegraph. It rests with the Government to fix its own accountability in all cases, and the circumstance that it now refuses to be responsible for the loss or wrong delivery of letters, or even of postal money orders, is a clear indication that it would not assume any liability for damages in the more serious mistakes that could result from telegraph errors. Government monopoly of the telegraph would then present to the public this condition of affairs. A very large increase of the delays, errors, and damages, and an arbitrary withdrawal of every means of indemnification for loss. The commercial public will scarcely contemplate with rapture any such state of things as that.

4. The Government espionage that would thus be exercised over all private business, and all political messages that should be entrusted to the telegraph, would become a serious menace to personal freedom, and enable any Government official to become a successful speculator or blackmailer on the knowledge of other men's business. So long as the telegraph remains in the hands of private persons or corporations, responsible in law for the acts of their servants, no general or serious harm can follow the possession of this knowledge. Any use made of it by the operators or agents of private corporations, whether for the purpose of revealing it to the public or for private benefit, would be fatal to their own reputation and business. Their employees understand that good faith in this matter is a condition of their retention, while Government employees would equally understand that their places depended mainly upon political influence, of which this espionage would become a part.

5. The increase in the official patronage of the Government would, of course, be one of the greatest evils of the proposed system. Not less than 30,000 of new offices would be created. Probably this is the reason why Mr. Chorpenning Creswell is so anxious to put it through.

6. By controlling the telegraph the Government would virtually control the press of the country. It could mould news to suit its own purposes; it could punish obnoxious journals in a thousand ways where there would be no redress. In short, it could possess itself of the only medium of public opinion.

While these arguments against the Government purchase of the telegraph lines will suggest themselves as potent against the scheme, the advantages that are claimed for it will likewise be found to be impracticable and vissionary. It is not true that the cost of telegraphing would be *reduced;* it would simply be transferred to the tax-payers. To carry messages at the proposed rates it would be necessary to put up at once three times the number of telegraph wires that are now in use. They would cost money, and cost the government more money than individuals or private corporations. The expense of managing the increased number of lines would be proportionately increased, and this increased expense would fall largely upon people who never use the telegraph. It is needless to enlarge upon the injustice of such a proceeding. The Government can, in no way, be more enterprising than private capital. New telegraph companies are organizing, and new lines building all the time. Competition will bring the charges for telegraphing down to the lowest figure at which the service can be afforded. That is low enough; and when that point is reached, there will be no robbing of Peter to pay Paul,—no taxing of one portion of the community to furnish cheap telegraphing to another.

EARLY REMINISENCES OF THE TELEGRAPH ON THE PACIFIC COAST.

San Francisco, Oct. 25, 1872.

This day nineteen years ago, the first line of telegraph on the Pacific coast was completed between this city and Marysville, and opened for business. It was built by the California State Telegraph Co. Its length was 200 miles, connecting with five offices, San Francisco, San Jose, Stockton, Sacramento and Marysville. On the day of completion, Jas. Gamble, who was appointed Manager at Sacramento, sent the first dispatch over the line to San Francisco.

The tariff from this city to Marysville, Sacramento and Stockton, was $2.00 for ten words, and 75 cents for each additional 5 words or less. The present tariff between these places is 25 and 10, and even at this *enormously* low rate, would you believe it, some of our papers are harping on the "great monopoly" and outrageous rates paid for telegraphing in this State. When will they be satisfied?

This line of 200 miles cost $150.000. It could now be put up for $25.000. Even at its high cost and expensive management, the line paid handsome dividends to its stockholders. The salaries paid operators were $150 to $250 per month. The line was poorly built and badly insulated, the latter being iron hooks set in blocks boiled in shellac, as nothing better could be had at the time. In dry weather, this style of insulation did very well, the top of the poles would have answered the same purpose, but when the rains came, "the old string"—as the boys called it—became pretty well soaked, so that it was a tight squeeze getting a dispatch through. We worked through two "rainy seasons" with the shellac plugs, when they gave way to rubber caps with iron shields, a decided improvement when new, but they proved a "delusion and a snare" in the end. The Wade "nigger heads" were their successors, and they in turn gave way to rubber hooks and blocks, which latter did good service for a time, but are now being discarded for the new screw glass, showing that we are coming back to first principles. This old line has been "reconstructed" so much, that it would now compare favorably with the boys jacknife, which he had used for so many years, but which had had three new sets of blades and two new handles during the time. The line is still standing, just as it was built, except that it has had its insulation renewed five times, and I might incidentally mention, has also had new wire and poles.

From 200 miles, the telegraph on this coast has grown to over 8,000, and is still marching on, over a thousand miles of wire having been put up since last spring alone.

Among the Pioneers who worked the "old line," and who are still with us, are Jas. Gamble, now General Superintendent of the Western Union Pacific Division; Geo. Senf, Manager at Virginia City, Nevada; John Pattison, Manager at Nevada City, Cal., and John Leatch, Chief Operator at Sacramento. Gamble and Senf are the only two who have never been out of service during that time. Leatch made a change to the "States," but in a few years drifted back. Pattison turned politician, and sank so low as to be a member of the Legislature, but couldn't stand more than one term. W. B. Ransom was the first Superintendent, but left the State after three years of service.

The reason for adopting the "five additional word" rate, instead of *each* added word, as in older States, was because early California used no smaller coins than a "quarter" or "two bitts," as it was and is still called.

When an old miner passed his dispatch into the office, he usually threw down a "slug"—an octagonal gold piece, worth $50. Instead of this, he sometimes *weighed out* the requisite value in gold dust. This latter was a very prevalent style of currency in the very earliost days of our State. Five cent pieces pass current now, and we are fast drifting towards the pennies.

Pioneer.

MR. FIELD'S BANQUET.

Mr. Cyrus W. Field gave a banquet at Buckingham Palace Hotel, London, November 28th, in celebration of the American Thanksgiving Day, at which Mr. Gladstone and other distinguished gentlemen were present. During the dinner several telegrams were sent to America, and answers received thereto, among which the following were exchanged between President Orton and Mr. Field.

London, November 28, 1812;

To Hon. Wm. Orton, *President Western Union Telegraph Company, New York:*

We are surrounded by those who are connected with the Submarine Telegraph lines to the Continent of Europe, Egypt, India, China and Australia, and they join with me in sending kindest regards to you, and we trust that the cordial relations which now exist between the great submarine lines of the world and the Western Union Telegraph Company may never be less, but grow stronger as we increase the cables that are necessary to transmit telegraph messages to all parts of the world.

C. W. Field.

New York, November 28, 1872.

To Cyrus W. Field, Esq., *London:*

Accept for yourself and convey to your guests my thanks for your and their kind greetings. It will continue to give the Managers of the Western Union Company pleasure to contribute to the friendly relations which now exist between the companies, whose lines and cables are circling the globe with bands, whose strength is measured by the friendships they aid to promote, and whose duration depends only upon the peace of the world which they assist to perpetuate. May you live long to enjoy the credit so justly your due for the part you have borne in this great work.

William Orton.

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FOREIGN TELEGRAPHIC ITEMS

THE traffic receipts of the Eastern Telegraph Company for the month of October amounted to £31,409, against £27,251 in the corresponding month of 1871—showing an increase of £4,158.

The special resolutions for effecting and completing the amalgamation of the British-Indian Submarine; Falmouth, Gibraltar and Malta; Anglo-Mediterranean; and Marseilles, Algiers and Malta Telegraph Companies, have been unanimously confirmed by the shareholders of the several companies.

Telegraph shares, which have been much neglected latterly on the Copenhagen Exchange, and followed a downward tendency, have now become an object of speculation, and are rising rapidly in value. The reason assigned for this improvement is that the Etatsrath Herr Tietjen, who has returned from a journey abroad, has succeeded in persuading the President of the French Republic to grant him the long wished for concession to lay down a submarine telegraph cable between a spot on the north coast of France—probably at Dunkirk—and Fanoe, on the coast of Jutland. Great things are expected in Denmark from this new line, as then the traffic with France and the south of Europe, as well as the transit communication with North America, and by-and-bye with Brazil, will be liberated from the present onerous and expensive necessity of making use of the German telegraph system. At the same time we learn from Copenhagen that the Siberian land lines, which have been broken, and the traffic interrupted by the late inundations, have been repaired and are again in full working order—which was not expected to be accomplished before the ensuing spring.

Major-General Von Chauvin, the Director-General of the German telegraph department, has tendered his resignation, and, at his own request, been placed at the disposal of the War Office at Berlin for active employment in the army.

The Northern Telegraph Company announce that the Siberian land lines, which had been interrupted for some months, having now been re-established their communication with China and Japan is again in perfect order, and that messages for those countries are accepted at all postal stations at a uniform rate.

The India Rubber, Gutta Bercha and Telegraph Works Company's steamer Dacia has left Silvertown with a submarine cable, to be laid direct from Spain (Bilbao) to the Land's End, Lizard Point, the company holding a concession to lay this cable from the Spanish Government.

The total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ending the 2d of November, 1871, was 312,054—an increace on the corresponding week of last year of 73,786.

THE new telegraph line in Japan will be opened in state by the Emperor as soon as completed.

The directors of the China Submarine Telegraph Company have given notice that the receipts for the year ended June 30th enable them to declare a final dividend of 4s. per share, making, with those already paid, a distribution of 8 per cent. per annum.

The advices from Buenos Ayres state that, according to expectation, in about a couple of months the completion of some telegraph lines which are in progress of construction from Valparaiso along the West Coast toward Panama, will bring Buenos Ayres within five days of Europe. The Transandine telegraph from Valparaiso to Buenos Ayres was in steady operation. The distance is 1,138 miles, of which 1,058 are in Argentine, and 180 in Chillian territory, and the line includes two snow cables of 30 miles over the Andes.

The defect in the Pentland Firth telegraph cable has been discovered. It is reported to have occurred a short distance from Wales, and the steamer Carolina is at present in the neighborhood waiting the first opportunity of fine weather to effect the repair.

THE LATEST BRITISH "BLUE BOOK" is the "Annual Report of the Postmaster-General," which shows, among other items, that during the last year 12,700,000 telegrams were transmitted from stations in the United Kingdom.

THE acting President of Costa Rica has given orders that the actual service of the telegraph stations should be improved as much as possible.

PRESENTATION TO MR. JAMES D. REID.

Upon the retirement, last Spring, from the telegraphic business, with which he had been intimately associated for twenty-seven years, of Mr. James D. Reid, his telegraphic friends and associates, and more especially those connected with the Telegraphers' Mutual Life Assurance Association, the success of which has been to a great extent the result of his unselfish interest and labor, desired to present to him a token of the affection and esteem in which he was held. For this purpose voluntary contributions were invited, which invitation was most cordially responded to.

On Saturday, 23rd ult., the amount collected was delivered to Mr. Reid, at the office of the Atlantic Cable Companies, No. 88 Liberty street, where the presentation took place. The letter of presentation from the Committee, enclosing a check for the amount contributed, and indicating the use to be applied, was handed to Mr. Reid by Mr. W. O. Lewis, with a few brief but appropriate and appreciative remarks on behalf of those who had voluntarily and gladly united in the testimonial.

Mr. Reid was evidently very deeply affected at the expressions of kindly and affectionate regard which illumined the close of his long and useful telegraphic career. He responded briefly but feelingly, expressing the pleasure and satisfaction which he had experienced during his many years of telegraphic service, and his deep and heartfelt appreciation of this last manifestation of the esteem and regard of his friends and former associates. Subsequently he acknowledged the receipt of the testimonial in the letter to the Committee which is published herewith.

NEW YORK, *Nov.* 22.

DEAR MR. REID—We are requested to ask your acceptance of the enclosed check for five hundred and eighty-three dollars and forty-two cents, with the suggestion that you employ it in making such additions to your library as may be most acceptable to you. It has come to us entirely voluntarily, and mainly from telegraphers widely separated from each other, accompanied by many kind words respecting your long and faithful telegraph service, and the true Christian charity ever exercised by you in your official as well as in your personal relations, and by sincere and earnest expressions of hope that your life may be long and your happiness complete. Will you, therefore, please accept the offering, more as a substantial indication of the universal kindly regard for you than for its intrinsic value, and permit us to continue always

Your sincere friends,

W. O. LEWIS,
A. S. BROWN,
A. B. CHANDLER,
D. R. DOWNER,
F. L. POPE,
Committee.

To JAMES D. REID, Esq.

NEW YORK, Nov. 23, 1872.

To W. O. LEWIS, A. S. BROWN, A. B. CHANDLER, D. R. DOWNER, F. L. POPE, *Committee.*

DEAR FRIENDS—Although I have already made a verbal acknowledgment in your presence of the ample gift to me of which you were alike the partners and bearers, yet you will not blame me if I desire that my expression of gratitude therefor take such a shape that it may reach the distant ones you so well and indly represented.

As I leave pursuits to which my best years and such ability as was mine were all affectionately devoted, it is pleasant to be made to feel that the same friendliness which twenty-seven years ago welcomed and aided me in my work, now comes to bless and iradiate its close; and it would be very grateful to me could I now see, not you alone but every well-remembered face associated with our past toils, that I might grasp again the hands of those who have in in the years now gone made labor to me a pleasure, and fringed every care with delight. Few men, surely, as in memory I live the past over again, can have had a sunnier path along which to do life's work. My only regret is that it has become necessary to recommence it under new auspices and with new companions.

Since you left me I have read the letter under cover of which your gift came. The kindness of the language has touched my heart. The gift was not needed to emphasize its expression, yet will be gratefully used to commemorate it. It will be devoted as you suggest, and which is in the line of my own needs and tastes. Some day I hope to be able to show you how much it has added to the beauty of my home and to my own personal enjoyment. It will be a memorial which will inspire me to be truer and kinder to my fellow men. God bless you all.

Gratefully and affectionately yours,

JAMES D. REID.

NEW SUBMARINE TELEGRAPH CABLE.

Telegraph cable works have been erected on the Pacific coast, at San Francisco, and the Electrical Construction Company have completed the first section of their first job, to wit, a cable for the British Columbian Government. It is intended to be submerged under Rosario Straits, to connect Vancouver's Island, at Victoria, with the Continent.

The cable is 35,000 feet in length, and weighs about 30,000 pounds. The conductor is composed of seven No. 20 copper wires of 97 per cent. fineness. The dielectric consists of two coats of pure gutta percha 9-32 of an inch in diameter, with intermediate coatings of Chatterton's compound. The gutta percha coil is served with two coats of machine banding, well tarred, and covered with a protecting armor of No. 9 galvanized iron wires, laid on spirally. Electrically tested, the resistance of the conductor is eight ohms, or B A units, per knot, and the resistance of the dielectric or insulating medium, 443,000,000 ohms per knot. The company has an order on hand to manufacture another cable 30,000 feet long, for the Puget Sound Telegraph Company, to establish a connection between Seattle and Port Townsend.

DEATH OF EMILE PROVOST.

M. Emile Provost, a French scientist and an inventor of considerable note, the originator of several improvements in electric apparatus which have been favorably received, died last week by his own hand in this city. He had taken up his residence here, and had, it is said, at the time of his death, completed an electro-motor, which, not working satisfactorily, his disappointment at the result and the devil of drink, brought upon him the sad state of mind in which he terminated his career. The causes were, it is said, the more likely to unsettle his reason from the effects of an injury to the head received by M. Provost some time ago, and from which he never fully recovered.

IN a recent article, in which the writer differs from an opinion formerly expressed by him, he supports his right to change his opinion by quoting an old dictum of Faraday's, that "the only man who ought really to be looked upon as contemptible is the man whose ideas are not in a constant state of transition."

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CORRESPONDENCE.

"BY THEIR WORKS SHALL YE KNOW THEM."

CHARLESTON, S. C., Oct. 29th, 1872.

To the Editor of The Journal of the Telegraph:

Mr. G. W. Bell, an old operator, and for a long time employed in the W. U. Telegraph Office in this city, leaves the service of that Company on the 1st of November, to engage in other business. By his genial disposition, and his many traits of kindness and gentlemanly character, he has won a host of friends. May he prosper, and may success crown all his undertakings. H.

INSURANCE MATTERS—CONTEMPLATED CHANGE IN POLICY.

To the Editor of The Journal of the Telegraph:

Much has been said and written upon the subject of appointing agents to act for the Insurance Association in the districts or sections in which they may be located. The officers and Executive Committee have given the matter full consideration, but have hitherto deemed it best not to make any such appointments.

It is thought, however, the time has now come when agents can be advantageously employed, and as fast as suitable men are found, and it is deemed best to appoint them, it will be done. They will, of course, serve without remuneration. Great care will be taken that only men of personal integrity who will take an individual interest in the well-being of the Association will be named.

The active interest shown shown by certain members at a number of points where we have a large membership is greatly appreciated by the Committee. They feel that our present prosperity is perhaps in a large measure due to these gentlemen who have voluntarily taken upon themselves much work, which otherwise would have been but poorly done, if not entirely neglected. D.

To the Editor of the Journal of the Telegraph:

It is of frequent occurrence that messages are sent, in which there is no interrogation, or answer asked for, and yet, replies are received, "collect," with "Tis ans." Parties receiving such messages often demur, and refuse payment. How are we to govern in this case?

Answer.—If the party to whom the answer is addressed refuses to pay for it, his correspondent will be responsible for the amount. We think the intances must be rare where such refusal would ensue.

To the Editor of the Journal of the Telegraph:

Why not transmit figures as written in telegrams offered for transmission rather than insist on having amounts always written out. It is a never ending source of annoyance to enforce rule requiring amounts to be expressed by letters. After a customer has spent ten or twenty minutes in preparing his telegram, he is likely to become sorely vexed when he finds, as is often the case, that he must rewrite his entire message to bring it within the requirements of a rule he can see no necessity for. Probably in most cases there would be no greater liability to error in transmitting figures than in writing them out. H.

Answer.—The rule requiring amounts or numbers to be written in words was made for the purpose of preventing mistakes. It may be true, as asserted by our correspondent, that there would be no greater liability to error in transmitting figures than in writing them out, but such is not the opinion of any experienced telegraphist with whom we have consulted upon this subject. A great many errors are made in transmitting amounts and numbers; and we suppose that the time will never come when accuracy will always be secured. Too much care cannot be observed; and the customer ought to be willing to assume a little extra work for the purpose of securing the correctness of his own despatch. Managers, when requiring customers to observe this rule, should explain the reason for its requirement, and should also advise their customers to insert the figures also, as an additional safeguard.

NASHVILLE, Tenn., Nov. 15, 1872.

To the Editor of the Journal of the Telegraph:

Keep a close lookout for a certain "Dead Beat and Jeremy Diddler" known as W. T. McGenty, alias Roberts.

He claims to be a railroad operator, and has good papers purporting to be from the superintendent of the Illinois Central Railroad, dated Centralia, Illinois, May, 1872.

He is unworthy of your confidence. The operators here, at Louisville, Ky., and Decator, Ala., know him something over a hundred dollars worth.

The last heard of him he was in Indiana.

He is about five feet eight inches high, weighs 130 or 40 pounds, ruddy complexion, Burnside whiskers, and when here, had his wife and two children with him, he so manages as to keep them in destitute circumstances for the purpose of exciting the sympathies of all charitable-disposed telegraphers. Let him severely alone. NASHVILLE.

RULE 54 READS AS FOLLOWS:

"All messages requiring an answer will have the word answer plainly written upon the envelope, and the Messenger instructed to make diligent efforts to obtain it; but should he fail to do so, the reason, in writing, must be returned to the Delivery Clerk, who will notify the office, from which the message is received. Messengers must in all cases be supplied with No. 2 blanks, on which answers can be written."

Complaint is made that this rule is not observed, and we have received several spirited communications upon the subject of which we publish the fol lowing well conceived epistles which we trust will have the effect of causing a thorough compliance with this excellent rule.

"I desire to call attention to the *fact* that Rule 54, one of the *most important* rules of the Company, is almost entirely disregarded. I know, of scarcely an office, large or small, that pays any attention to it except in cases of *non-delivery* which falls far short of compliance with the wise provisions of said Rule.

I have watched carefully the effects of this neglect upon our business, and can affirm positively, and am sure that every Manager will after careful observation agree with me in the following statement:

1st. This neglect neutralizes five-eighths of the benefits the company should receive from what no other Telegraph Company in the world possesses, *i. e.*, its systems of through or long circuits.

2d. This neglect multiplies office messages, and consequently occupies the wires uselessly and to the detention of other business.

3d. This neglect *increases clerical work.* Probably nine out of ten Delivery Clerks who have not given Rule 54 a fair trial will say this is not so, but I reply if they have not tried it *how do they know.*

4th. This neglect leaves the *answers* to straggle into hands of the opposition company, or to be brought to our office at the leisure or conveyance of the parties addressed or their employees.

5th. This neglect, together with the sloath of parties who delay or neglect to answer promptly, is, and has been a prolific source of driving our best customers to the opposition.

6th. This neglect plainly decreases business, both directly and indirectly.

7th. This neglect is most probably owing to the indifference on the part of small offices and at large offices to fact that it seems like a mammoth undertaking.

Whereas the reverse is true. The rule is simple and has been followed here, and can be at any office on W. U. Lines.

It is true there are obstacles to be overcome at first, but they are of a nature that any vigorous delivery clerk can brush away after a week's trial. I might state other points if it were necessary. I am satisfied, and would take the strongest kind of an affidavit, that *this neglect or omission* to comply with Rule 54 has and is now retarding the growth of the company's business thousands of dollars monthly."

E. H. B.

"In reference to rule 54 the Company is blamed every day because answers do not come back promptly. When upon inquiry it is found that the messages go through quickly, and are in most of cases delivered in a few minutes after they are filed here, and the offices, in answer to our inquiries 'Why no answer?' say the party is not at home, or will write, or cannot answer until to-morrow, or will not answer at all, I understand from rule 54, that is the duty of the receiving office to furnish such information without our having to ask for it. It would save the Company a great deal of censure, and be more satisfactory to our customers if offices would attend to the rule." J. A. H.

"Customers, and especially traveling agents, come in office every day. Complain about not getting answers from their messages, or reason from office where message was sent to when answer was requested in body of message. We have to tell them, according to our rules, that their message was received and delivered promptly, and if not they would notify us, and we would notify them. They come back again in two or three hours, and if no reply is there they want us to send office message asking for answer. Most of the time we have to do it. They then want to know how soon we will hear from it. We tell them in about one or two hours. We send office message asking them to comply with rule 54, quick, and it is every eight times out of ten that we do not get a reply. We have to send second request, and then in about three or four hours we get answer that party left town, or that there is nobody there to give answer. Now, if all offices in such cases would act in compliance with Rule 54, it would save time and trouble, and one-third of the office messages we have to send." A. E. H.

"I find no trouble in carrying out Rule 54 in my department. We are watching every message that requires an answer, and either get an answer or notify the sending office why. The system for this work in this office is attended to satisfactorily by a messenger boy 14 years old." J. T. H.

A. C.—Pittsburgh is correct. There are six words. Figures are to be counted for as many words as are used when written out to represent them.

J. S. L.—If you have over-remitted to the Company, you are entitled to have it refunded, and, by forwarding satisfactory evidence of the same, the amount will be remitted to you. The Company only desires to receive what it is justly entitled to from any source, and is as desirous of the correction of errors when they are in favor of the Manager as when they are in favor of the company.

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W. T. L. of Effingham is informed that the concern alluded to in his letter, is a swindle, and thus far, has not succeeded in deluding any sensible person into joining it. So far as its power now to do harm is concerned, it might as well be out of existence. Like all conspiracies conceived in a spirit of malevolence, light and exposure becomes fatal.

MANAGER.—Mauch Chunk. See reply to W. T. L.

H.—Certainly; a party desiring to send a message to any place, and mailed thence to any other place, has a right to do so by paying the regular tolls to the point at which it is to be mailed, and the postage.

A BEGINNER has been misinformed. We shall shortly publish a full description of the manner in which the Atlantic cable is operated.

OPERATOR.—We think it would—most decidedly.

B. G.—We think there is no material difference between the West and the East, when all the other considerations are substantially the same.

A. A. F.—You might do so under such circumstances, provided the party was willing to pay full rate, as provided for in Executive Order, No. 141, published in THE JOURNAL OF THE TELEGRAPH in the issue of Sept. 16, 1872.

J. W. F.—THE JOURNAL is sent to every office for the information and instruction of those employed by the Western Union Company. Managers are required to observe all orders and rules published therein, and to transfer to their tariff books the record of new offices, changes of tariff, etc. The paper is then to be carefully filed away for reference.

W. W. S.—It does not occur to us that there would be any particular gain in entering general information in red ink and new offices in black, but we see no objection to any one doing so if he prefer.

OPERATOR.—We are decidedly of the opinion that good temper and pleasant words are much more desirable than ill temper and angry words; and that, as a general thing, it is easier to conduct business according to the former than to the latter plan. It is, however, to be borne in mind that human nature is human nature, and embraces a great variety of temperaments, to some of which it is as impossible to be always pleasant as it is for us always to enjoy sunshine. You must, therefore, not be discouraged if your train dispatchers and other associates are sometimes cross and indulge in an unnecessary "blow." Do your own duty manfully, cheerfully and pleasantly, and resolve that when you arrive to the dignity of train dispatcher you will always have a kindly word and a "good morning" for all of your subordinates when you commence your day's work, and that, when the day is spent, you may not remember to have spoken a word which you could wish unsaid.

L. W. C.—Very much obliged for your favor. Hope you will induce your friends to do likewise. We are trying to make a success of the paper, and duly appreciate all efforts, from whatever source, to extend its circulation.

We think that by soaking porous cups and carbons every night they may be kept in good working order for many years.

E. S.—As a rule, we should not think that the proprietors of a Summer hotel who had the privilege of sending free messages on account of the location of offices in their hotel, would be entitled to such privilege after the closing of the office. All such arrangements, however, are properly the subjects of negotiation with the Company, and your Superintendent would be the proper party to apply to for directions upon this point.

GENUINE is referred to accompanying explanation under head of "Red Messages" for an answer to his communication.

G. R. S.—"St. James Hotel" should be counted as two words. According to Rule 9, names of persons and places, when given to things, must be counted according to the number of distinct words in each, and, surnames, containing any prefix, are to be counted as one word. St. James, being a surname, is one word, and Hotel being one word, and both being applied to designate a thing, must be counted according to the number of distinct words in each, viz: two.

C. G. S. It was entirely wrong to send the messages alluded to, free. Neither the railroad agent nor his correspondent have any right to send business messages of that character free over the wires of this company. You should report the matter at once to the Superintendent of your District.

Winchester, Va., is informed that "According to" are two words, according to Webster, as well as according to common sense.

C. A. O.—It is not true that this company has applied for an injunction to stop all opposition lines on account of their infringement of the Page patent.

Red messages must not be delivered until the next day, except as specially provided for in Executive Order No. 141.

CHARLEY.—See Executive Order No. 141.

C. P. M.—"Hard up" are two words. "Payday" is one word.

OLD 76.—Both should be entered in the tariff books. Send business by the cheapest route.

W. T. L. It appears from your statement that Mr. H. acted discourteously and unwarrantably in refusing to deliver your message. According to the rules of the Company, the receiving operator has no discretion in the premises, but must receive, forward and deliver any message from any other office unless it should endanger life or property, in which case the receiving office will hold such message until advised by the District Superintendent. If any message is improperly sent or counted, the manager of the receiving office must immediately notify the District Superintendent.

You should forward a statement of your case to your Superintendent, who will, undoubtedly, reprimand the party at fault.

A MANAGER requests us to render a verdict in the following case: To-day I received a message for Mr. Taylor; no other address given. There are no less than twelve Taylors here, each of different family. Does the Company require the message to be taken to each Taylor until he gets the person who the message is intended for, or am I to hold message until I get full address? By reply to this simple question, you will greatly favor.

Answer.—It would be well, under such circumstances, to send the message to such members of this numerous family as are accessible; failing to hit upon the right one, it would be proper to ask for better address.

RED MESSAGES.

Executive order No. 141, dated September 16, 1872, provides that "messages to be transmitted at half rate will hereafter be received at any hour during the day until offices close for the night. Offices opened all night will receive such messages until midnight.

"The tolls on half-rate messages will in no case be less than twenty-five cents.

"If a half-rate message has been received at the place of destination, and the party to whom the same is addressed calls at the office for it, the message may be delivered to him on his paying the difference between half rates and full rates on such message. No change will be made in the time of delivery of half-rate messages unless specially provided for."

PROCEEDINGS AT THE SIXTH ANNUAL MEETING OF THE TELEGRAPHER'S MUTUAL LIFE INSURANCE ASSOCIATION.

The sixth annual meeting of the Telegraphers' Mutual Life Insurance Association was held at the Western Union Telegraph building, No. 145 Broadway, on the afternoon of November 1st., Mr. W. O. Lewis in the chair. The minutes of the last annual meeting, also those of the special meeting held March 21, 1872, were read and approved. The reports of the Treasurer and Secretary were read and accepted. (These reports appeared in our issue of November 15.—ED.)

The suggestion contained in the report of the Secretary with reference to the appointment of local agents by the Executive Committee, was ordered to be carried into effect.

The Secretary presented the case of L. S. Daniels, of Hempstead, Texas, who had remitted thirteen dollars by registered letter for new applications and the payment of assessments in advance. Proof was furnished that the money was stolen from the mails. Mr. Daniels claimed that credit should be allowed by the Association. The Executive Committee declined, and Mr. Daniels, acting upon the suggestion of the committee, appealed to the annual meeting. After the matter had been fully discussed, and the letter from Mr. Daniels having been read, the action of the committee in regard to the matter was approved.

The suggestion in the Treasurer's report that the Executive Committee have discretionary power to use the reserve or expense fund on hand in payment of an assessment was adopted.

A Resolution was passed directing the Secretary to express the thanks of the association to Mr. Orton and the Western Union Telegraph Company for their generous action in paying the sum of $100 through the association to the heirs of such members who at the time of their decease were in the Company's service.

Mr. O. W. Lewis was then nominated for Treasurer for the ensuing year; declined. Mr. A. S. Brown was then unanimously re-elected Treasurer.

Mr. W. K. Applebaugh was nominated for Secretary; declined. Whereupon Mr. D. R. Downer was elected.

On motion, the sum of $150 was authorized to be paid by the treasurer for assistance during the coming year.

A vote of thanks was extended to Mr. Applebaugh, the retiring Secretary—also, to Captain Wm. Mackintosh, for providing accommodations for the meeting. Adjourned *sine die*.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is upwards of 7,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, DECEMBER 2, 1872.

GOVERNMENT TELEGRAPH SCHEMES.

The near approach of the assembling of Congress is heralded as usual by the promoters of the various schemes for governmental interference in the business of telegraphy, in the shape of newspaper articles and correspondence, the purport of which is to show the great public advantages to be gained by such intervention.

In one of the leading newspapers of this city a letter was published not long since dated from London which contained a vast array of erroneous statements concerning both the Western Union Company and the telegraph business generally, the sole object of which seemed to be to mislead the public upon this question.

We recognize in this correspondent the author of a series of rhetorical and statistical romances purporting to be based upon the results of his investigations of the operations of governmental telegraphs in Europe, which have been used in this country during the last four years by the promoters of the Washburne scheme and of the stupendous Hubbard job. The repeated exposure of the gross errors of this writer and the proof of his inability to discover the truth, or even to comprehend the effect of his demonstrations, when, as is sometimes the fact, they destroy his own case, appear to have excited in him a decided prejudice against this Company. Whenever the question of Postal Telegraphs, says the writer, has been brought before the United States Congress, attempts have been made to place in doubt the veracity of statements regarding European telegraphy, and especially those statements which had reference to tariff rates have been called seriously into question. Now, concerning these two declarations, it gives us pleasure to say that they are both strictly true; not only have attempts been made to place in doubt the veracity of his statements, but it is equally true that these attempts have been attended with uniform success. The justification for calling seriously into question his statements which had reference to tariff rates will be apparent by an examination of the following list of rates from Washington to thirty-two stations in as many different States, which this *veracious* advocate of governmental telegraphy says are the rates charged by the Western Union Company. The first column contains the rates given by this correspondent which are called seriously into question by the figures of the second column, which contains the rates actually charged.

	Pretended rate.	Actual rate.
Ellsworth, Me	$2.10	$1.60
Keene, N. H	1.75	1.10
Montpelier, Vt	2.00	1.30
Waltham, Mass	1.75	1.20
Bristol, R. I	1.30	1.10
Fairfield, Conn	1.15	90
Genesee, N. Y	1.50	90
Harrisburg, Pa	70	40
Plainfield, N. J	1.15	75
Mt. Vernon, O	1.75	1.10
Annapolis, Md	45	25
Lansing, Mich	2.20	1.50
Lafayette, Ind	2.00	1.25
Peoria, Ill	2.80	1.50
Fon du Lac, Wis	2.80	1.50
Minneapolis, Minn	3.65	1.50
Des Moines, Iowa	3.20	2.30
St. Joseph, Mo	3.70	2.40
Little Rock, Ark	3.75	3.00
New Orleans, La	3.25	2.50
Jackson, Miss	3.25	2.50
Montgomery, Ala	2.75	2.40
Atlanta, Ga	2.00	1.75
Columbia, Tenn	2.25	2.25
Charleston, S. C	2.00	1.00
Raleigh, N. C	1.25	1.00
Tallahassee, Fla	2.75	2.40
Lebanon, Ky	2.25	1.65
Richmond, Va	75	25
Austin, Tex	5.50	4.25
Lawrence, Ks	3.60	2.55
Omaha, Neb	3.75	2.55

Thus it appears that, with but a single exception, the actual rates are less by an average of *thirty per cent.* than those given by this romancer, who waxes indignant because his veracity has been "called seriously into question." Certainly it will be beyond question hereafter.

But this exhibit is more false in the inference which it seems to justify than in the direct statements. Presumptively Washington has something to do with these thirty-two stations; yet, taking the month of May last, we find that *only six per cent.* of the business of Washington was with them. *Seventy per cent.* of the business of that month at Washington was with eight offices, not named by this advocate of government telegraphy.

The following table gives the names of these offices with the distances and rates from Washington, compared with rates from Paris to other European stations about equally distant.

	Distance from Washington.	Distance from Paris.	Rate from Wash'n.	Rate from Paris. (Gold.)
Baltimore	40		25	
Fontainbleau		36		20
Boston	460		55	
Frankfort		452		60
Cincinnati	610		1.00	
Bremen		558		80
Chicago	845		1.00	
Vienna		897		1.20
Louisville	718		1.25	
Venice		739		80
New York	226		40	
Brussels		215		60
Philadelphia	138		35	
Tours		145		20
St. Louis	952		1.50	
Olmertz		934		1.20

Thus it will be seen that the rates for the same distances in Europe are about the same as in this country. But suppose that it could be shown that the rates were cheaper in Europe. This by no means would prove that governmental telegraphy was desirable. The official reports of the operations of the telegraphs in Europe for 1870, the last year for which full returns have been published show that the expenses for the year were $19,675,487, towards which the receipts furnished $14,455,352, leaving a deficit of $5,220,135, to be provided for by the proceeds of taxation. These figures offer a very fair illustration of the economical argument against government telegraphy. Such an expensive luxury the Governments of Europe may from State policy, indulge in, and their ambition, fears, or mistaken views of the public need may prompt them to squander the money of their people in carrying on the business of telegraphing, but in this country, a deficit of several millions a year would never be tolerated for any such purpose.

Of the total expense attending the operation of the telegraphs in the United States, over 65 per cent. is paid for labor alone. Any increase of the business must necessarily call for an increase of labor, and the Government, if it take the lines and works them at a low rate, must either do so at a loss or compel the operators to serve at greatly reduced salaries. Government telegraphy in this country, if intended to be self-supporting, must be performed at rates as high as those now charged. If a low rate should be inaugurated, there would be a large deficit to be made up by taxation. In this case those who do not wish to send telegrams would be taxed for the benefit of those who did. That the telegraph is not of such general use as to render it a necessity for all, is shown in the fact that only one telegram is sent per annum for every three inhabitants, and yet the number of telegrams per head annually sent in this country is greater than in any other country in the world. It is said by some of the advocates of Postal Telegraphy that messages are sent throughout Great Britain at a uniform rate of twenty-five cents, and that a profit is made upon the business; and the question is asked why the same rate cannot be made for this country. If the statement were true, which it is not, it would only be necessary to do two things in order to secure this result, viz.: first, hire operators at from five to eight dollars per week, the wages paid to the best class in England, and, second, to compress the territory of the United States within the area of the British Islands; or, in other words, to remove the population of the United States to within the territory of the New England States.

If the genius of our institutions and the fundamental principles of our polity did not forbid Government supervision of telegraphs, there are two circumstances which, in this country, must always make our telegraphic system too unwieldly to be managed by a centralized bureau of Federal officers: One is the vast area of territory over which the network of wires extends, and the others the prodigious activity of our people and the vast increase of business to which the system of telegraphic communication must adapt itself. How these exigencies would be met it is easy to foresee, and also what a strorm of obloquy would be evoked by the delinquencies of Government appointees, who held their places by political favor. Our telegraphs, like our banks and our railroads, must of necessity be left to private enterprise. The men who invest in these great enterprises their capital and skill are alone competent to manage them with economy and success. The experiment, wherever it has been tried, with even the small success achieved in Europe, of placing the telegraphs of the whole country in the hands of officials of the Government, requires a set of civil service regulations of a very different kind from those which ever have been or are likely to be established in the United States. If attempted here, the project could only add to the sixty thousand officials now appointed by the Government, and would thus open up new temptations and facilities for political corruption; while, on the other hand, the service would be so unsatisfactorily performed that the costly scheme would very soon be overwhelmed by popular opposition, and its destruction enforced by the universal voice of a resistless public demand.

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THE proceedings of the Sixth Annual Meeting of the Telegraphers' Mutual Life Insurance Association will be found in another column of this paper. At this meeting but little business was transacted, owing, doubtless, to the very limited space of time judged by those present to be necessary for the performance of business affecting the closest interests of nearly two thousand members, who are scattered broadcast over the face of the country. Some thirty minutes were consumed in listening to the reading of the reports of the Treasurer and the Secretary and the discussion of a few unimportant matters. Then followed the election of officers for the ensuing year and an adjournment *sine die*.

There appeared in a recent issue of the JOURNAL a communication, complaining of the lack of interest generally manifested by members outside of New York and the immediately adjacent localities, suggesting as a remedy the removal of the headquarters. In commenting upon this communication, somewhat superficially, it must be confessed, we strongly endorsed this suggestion. Reflection, however, has brought us to a different opinion, and we are now strongly convinced that the suggested change would not prove an adequate remedy, and that the lack of interest is as great at this point as at others. There has got to be a radical change in the administration of affairs, in order to enlist the sympathies and interests of those whose sympathy and co-operation it is desirable to obtain. That the meeting partly recognized this fact is evident from the resolution adopted authorizing the appointing of agents in different sections. But this resolution did not go far enough. In the present condition of affairs the members of the Association located in the city of New York virtually control its action and policy; and while this remains the case no progress need be looked for elsewhere. It may be all well enough to say that this is an accidental state of affairs; that the question of locality does not, and should not, enter into the composition of an annual meeting; yet geographical considerations serve to render this view imperative. Prejudice is blind, and had much better be conciliated than opposed.

There are probably various ways of producing the required harmony and co-operation, but the plan we here suggest appears to us to be simple, yet comprehensive. Let the whole country be districted, each district to elect its representative, who shall also act as agent, to receive and forward notices and the amounts assessed. Such agents could be appointed for the first year, or until an election could be had. It would be well in these districts to conform, as nearly as possible, to State lines; but where a large membership was contained in a State it might be subdistricted. If each district, through its representative, had a vote at the Annual Meeting, sectional jealousy would be disarmed, and the Association would become what it is supposed to be, but which, in the opinion of many, it is not—national. The manner of voting and interchange of views could readily be carried on through the mail; stated questions could be voted upon yearly, and in this manner a lively interest and progress could be maintained. The views of any district could be conveyed to others by communication to the JOURNAL, which will gladly lend its aid in any matter conducive to the interests and welfare of the brotherhood.

There is another matter in which greater circumspection is necessary, and that is with regard to the state of health of applicants for a policy. The present system is too loose; and recent events have shown that the confidence of the Association in the endorsers of applications has bean abused. Instances have been known, and one notably of late date, where a policy was issued to a person in the last stages of consumption, upon the endorsement of a manager of an office, that the applicant was in a fair state of health. Such an endorsement probably arose from a generous feeling, but was in the last degree unjust, inasmuch as the applicant had evaded, until the approach of death became unmistakable, the responsibilities and pecuniary aid to others, which would have been assumed by an earlier membership.

We throw out these suggestions in the hope that the seed will not drop upon stony soil. We will not press their adoption until convinced that nothing better is practicable. It is certain, however, that the appointment of agencies throughout the country, simply for the purpose of facilitating collections, is not real progress, and it will fail to secure the desired ends. Not until the whole membership, in some practicable manner, has a voice and a vote, will the Association embody the entire fraternity.

GOOD WORK.

WE had not intended to make especial notice of any operating service, where all had done so well on the occasion of the great fire in Boston, but the feats of two operators employed by the Western Union Company, at New York, so nearly approach the marvelous, that they should be placed upon record.

With the duplex system on Monday, November, 11, Mr. F. H. Seibert received from Boston, in six and a half hours 330 messages, 157 of them without a break. They were sent by Mr. William McFarland. At the same time nearly as many more were going in the other direction upon the same wire. Upon another occasion Mr. Seibert received 221 messages without breaking.

On Wednesday November, 13, between the hours of 8.45 A. M., and 5:30 P. M., Mr. T. M. Miler sent to Boston with the Phelps printing instrument 700 numbered messages, and between 50 and 100 office messages.

This service stands unrivaled.

THE UNITED STATES TELEGRAPH MANUFACTURING AND SUPPLY CO.

In our advertising columns will be found the advertisement of the United States Telegraph Manufacturing and Supply Co., of Philadelphia.

They have the best facilities for the manufacture of telegraph apparatus of every description.

Mr. Wm. D. Sargent, who is the business manager of the Company, is a telegrapher of many years experience, and an electrician of great ability.

THE extent to which the telegraph has superseded the mails is well illustrated by recalling the history of the Boston fire. On Monday morning the *Gazette* printed eleven columns of matter relating to the great disaster, although the fire was raging even while our readers were perusing the accounts of what it had done the day and night before. Since then we have daily printed, as have done all the other leading papers of the country, in addition to the reports furnished by the Associated Press, from one to two columns of special despatches. Everything of interest, from little incidents to personal experiences and discussions of the value of Mansard roofs and the widening of Boston Streets, has been sent us from either Boston or New York. Of what use now would be letters? Who would read new accounts of the origin of the fire, the sweep of the flames, the destruction of business houses, the excitement in the city, all now being old news and as stale as news of the Chicago fire? Yet, what else than a skillful re-dressing of the old news could a correspondent, writing from Boston, do for his paper? The Chicago fire would have been just as fully reported but for the fact that the wires were down and the facilities of the telegraph office were much curtailed. This fact rendered such telegraph service as the country has had the advantage of this week quite out of the question.—*Cincinnati Gazette, Nov.* 16, 1872.

The *Journal* can bear testimony to the extraordinary full details of the fire furnished to the entire country by the Associated Press. These details were the work of the telegraph operators at Boston, who, as we learn from Mr. Orton, the President of the Western Union Company, performed more than four times the labor that was ever before executed within a corresponding period of time. In token of the services performed by them Mr. Orton has instructed the Division Superintendent to issue a general order thanking the Boston operators.—*Boston Journal.*

MR. GEO. T. WILLIAMS, of Cincinnati, brings to the notice of Railway Companies and others in need of manifold paper, agate pens, and other material, now regarded essential for the successful performance of the duties of train dispatching, the fact that he is engaged in that line of business, and is prepared to fill all orders with promptness. Mr. Williams can be relied upon. See his advertisement.

THERE was recently a collision on the Erie Railway, by which the engineman and fireman on one of the locomotives were instantly killed. Their widows brought suit for damages, and the plea of negligence is given as follows:

"It was claimed that the accident which caused the death of Chapman and Chasselette occurred through the negligence of the train dispatcher at Buffalo, in telegraphing two trains to pass each other. The telegrapher, it was claimed, was intoxicated at the time, and that the defendant had sufficient notice that his habits were bad. The further question was presented and argued at length as to whether the system of running trains by telegraph, for convenience of business as was shown in this case, is not, in itself, negligence."

The verdict in the first case was, for the plaintiff, $5,753.47, and in the second case for the plaintiff, $5,756.49, the trial being before the Circuit Court in Buffalo.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY,

September, 1872.

APPOINTMENTS.

F. E. Wilcox.....Brooklyn, N. Y.
E. D. Stevens.....145 Broadway, N. Y. City.
Wm. M. Allison..... " "
J. Cummings..... " "
C. C. Carpenter..... " "
J. E. Hurley..... " "
E. C. Keeler..... " "
F. L. Rector..... " "
Emily H. Harris..... " "
Miss M. L. Bowditch.....134 Pearl Street "
F. H. Smith.....Canal St. n Bd'wy. "
Miss Georgiana Lawney.....Cooper Union, "
P. Carroll.....Station H, "
H. Johnson.....117 Worth St. "
John F. Stevens.....Moncton, N. B.
N. M. Heminway.....Bay View, Mass.
A. N. Dyer.....Harrington, Me.
F. G. Caldwell.....Portsmouth, N. H.
S. C. Davis.....(Depot) "
M. H. Bryant.....Portland, Me.
J. Lawler..... "
Miss Annie Crocker.....Searsport, Me.
Geo. W. Leet.....Bellows Falls, Vt.
B. J. Andrews.....Richmond, "
E. E. Eastman.....Lyndonville, "
H. V. Hall.....Becket, Mass.
Miss A. F. West.....Hartford, Conn.
Miss H. M. Stanley.....Lonsdale, R. I.
Frederick Cooke.....Norwich, Conn.
Austin Woodard.....Providence, R. I.
L. Mundry.....Shaker Village, Mass.
J. B. Russell.....Spencer, "
Peter Cunningham.....Worcester, "
W. F. Snyder.....Duxbury, "
G. D. Mills.....Boston, "
B. F. Stratton..... " "
Geo. D. Colgrove..... " "
Wm. M. Talcott..... " "
Thomas Stewart.....Albany, N. Y.
H. Williamson.....Oswego, "
E. F. Smith.....Schenectady, N. Y.
J. C. Bryan.....Rochester, "
Miss Annie Richards.....Skaneateles, "
W. S. Bullock.....State Bridge, "
Thomas T. J. Murray.....Carbondale, Pa.
Wm. Blackham.....Waverley, N. Y.
J. A. Jordan.....Bloomington, Ill.
Wm. Roche.....Davenport, Ia.
T. L. Wilson.....Des Moines, "
Ralph Slaymaker.....Rock Island, Ill.
C. S. Soule.....Sioux City, Wis.
E. Erasthauser.....Chicago, Ill.
A. Carroll..... "
Edward Stanton..... "
W. G. Wilkins..... "
G. W. S. Hurd..... "
John C. Tallman.....Kansas City, Mo.
John H. Powers..... " "
Charles B. Patrick..... " "
Robert J. Hewett..... " "
L. L. Adams.....Sedalia, "
H. G. Buckingham.....St. Joseph, "
C. M. Towne..... " "
M. C. Hart.....St. Louis, "
Carroll C. Rawlings..... " "
John H. Topliff..... " "
Thomas P. Wheeler..... " "
James O'Toole..... " "
Joseph Rourke.....Bitter Creek, Wyo. Ter.
C. D. Hay.....Denver, Col.
M. D. Hamlin.....Divide, "
W. C. Annor.....Golden, "
Richard Starr.....Salt Lake, Utah.
M. E. McCoy..... " "
R. W. Purdon.....Parker's Landing, Pa.
W. Knight.....Pioneer, "
J. A. Duncan.....Sandy Creek, "
John Ryan.....Pittsburgh, "
W. J. McElroy..... " "
F. S. Hogan.....Bay City, Mich.
Robert C. Macready..... " "
F. M. Hubbard..... " "
T. W. Niles.....Dunkirk, N. Y.
F. D. Lyon.....Grand Rapids, Mich.
M. W. Bescher.....New Baltimore Village, Mich.
E. A. Brakenridge.....Oseola, Mich.
Wm. P. Thompson.....Port Austin, Mich.
E. C. Jenney.....Sandusky, O.
Geo. F. Howard.....Mackinaw City, Mich.
J. S. Woodruff.....Buffalo, N. Y.
A. L. Wilhelm.....Cleveland, O.
N. F. Wood..... " "
E. S. Crull.....Arcadia, Ind.
G. E. Cheney.....Indianapolis, "
Wm. Fellows..... " "
E. A. Hawkins.....Kokomo, "
C. D. Andrus.....Logansport, "
W. M. Fisher.....New Albany, "
P. L. Ryder.....Columbus, O.
W. H. Jones..... " "
L. A. Madison..... " "
Wilson Frank.....Florence, "
J. Kimball.....Pomeroy, "
G. A. Temple.....Vincennes, Ind.
L. D. Hamilton.....Cincinnati, O.
J. McCabe..... " "
A. M. Paddock..... " "
S. D. Spriggs..... " "
W. H. Jones..... " "
W. H. Padgett.....Alexandria, Va.
C. A. Glascock.....Concord, N. C.
W. Hancock.....Wilmington, "
Thomas A. Closs.....Abbottsburg, "
L. B. Pennington.....Luneaburg, "
N. A. Lee.....Lumberton, "
J. W. Burnton.....Chattanooga, Tenn.
T. M. Boyle.....Augusta, Ga.
T. C. Rush.....Berzelia, "
T. R. Rusk.....Eufoula, Ala.
E. R. Henderson.....Lake City, Fla.
B. W. Hard.....Granitesville, S. C.
J. Burch.....Orangeburg, "
J. R. Graves.....Aiken, "
L. T. Beatty.....Marion, "
K. C. Murray.....Mobile, Ala.
James Garrett.....Patona, "
Geo. L. Davis.....Rome, Ga.
R. S. Pope.....Birmingham, Ala.
G. E. Weber.....Selma, "
J. T. Rabbith.....Blount Sp'gs, "
Thomas Fox.....Madison, Miss.
J. H. Gordon.....Kenner, La.
C. A. Clarke.....Guthrie, Ky.
J. M. Barnes.....Moscow, "
L. W. Garner.....Tupelo, Miss.
John Thomson.....Whistler, Ala.
C. W. McMahon.....Gainesville, "
F. G. Montgomery.....Frankfort, Ky.
F. E. Bowen.....Louisville, "
G. B. McCoy..... " "
H. L. Henderson.....Delhi, La.
F. Voelocher.....Bryan, Tex.
Z. I. Nutt.....Galveston, "
Geo. L. Herndon.....Groesbeck, "
W. A. Kennon.....Liberty, "
R. E. Parned.....Martin, "
Flora A. Egan.....Mexia, "
W. B. Ector.....Palestine, "
E. C. Marston.....Hutchins, "
T. W. Parks.....Phelps, "
Edward Flynn.....Algiers, La.
J. Martin Boehm.....Raceland, "
J. Donnelly.....New Orleans, "
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C. A. Plummer.....Oroville, "
J. H. Haines.....Brooklyn, "
J. L. Sears.....Hamilton, Nev.
J. B. Burnett.....Redding, Cal.
A. L. Baker.....San Francisco, "

RESIGNATIONS.

F. Bradnock.....145 Broadway, N. Y.
W. K. Smith..... "
J. F. Agne..... "
F. G. Griffiths..... "
W. H. Lyons..... "
J. R. Dennis..... "
Mrs. L. Ellsworth..... "
Emily H. Judge..... "
Libbie Van Heusen..... "
E. A. Gallup (Mrs.).....134 Pearl st., N. Y.
W. S. Forsey.....Broadway and 6th Av., N. Y.
F. W. Wentworth.....Broadway cor. Spring St.
H. A. Buttrick.....Bay View, Mass.
O. D. Stickney.....Portsmouth, N. H.
Chas. F. Gordon.....Searsport, Me.
M. C. Cutler.....Bellows Falls, Vt.
Miss O. L. Wood.....Plymouth, N. H.
Geo. W. Metcalf.....Richmond, Vt.
J. F. Shorey.....Lyndonville, Vt.
M. J. Taylor.....Becket, Mass.
F. H. Taylor.....Hartford, Conn.
Miss E. C. Busher.....Lonsdale, R. I.
Geo. F. McPhilomey.....Newport, R. I.
Geo. W. Flagg..... " "
Hattie A. Wilcox.....Shaker Village, Mass.
Nettie Drury.....Spencer, "
P. L. Ryder.....Worcester, "
A. C. Allison..... " "
Miss E. T. Beals.....Watch Hill, R. I.
Thos. R. Finan.....Boston, Mass.
C. H. Ormsby..... " "
J. F. McHugh..... " "
Miss F. K. Nichols.....Thompson, Conn.
A. G. Rider.....Tiverton, R. I.
John Gay.....Albany, N. Y.
E. A. Beardslee.....Saratoga, "
Fred. L. Rector..... " "
E. D. Stevens..... " "
M. E. Hickey.....Schenectady, N. Y.
H. W. Smith.....Rochester, "
J. H. Emerson..... " "
H. H. Doolittle.....Sharon Springs, N. Y.
Annie Gray.....Skaneateles, "
B. M. House.....State Bridge, "
John M. Price.....Davenport, Ia.
S. E. Mills.....Keokuk, "
E. K. Bailey.....Rock Island, Ill.
F. E. Williams.....Sioux City, Iowa.
C. H. Parr.....Chicago, Ill.
C. T. Day..... " "
A. M. Sill..... " "
D. S. Foote..... " "
E. B. Ludlow..... " "
C. L. De Forest..... " "
H. G. Buckingham.....Fort Scott, Ks.
John W. Strong..... " "
Geo. E. Cheney.....St. Louis, Mo.
W. S. French..... " "
Ghas. L. Snyder..... " "
H. S. E. Austin..... " "
S. M. Allen.....Denver, Col.
A. M. Bush.....Golden, "
Harry Orr.....Parker's Landing, Pa.
C. W. White.....Shamburgh, "
A. J. Stephenson.....Titusville, "
Chas. U. Scott.....Detroit, Mich.
Wm. E. Clarke.....Indianapolis, Ind.
F. C. Fox.....New Albany, "
P. Densmer.....Kokomo, "
O. D. James.....Lafayette, "
N. R. Donaldson.....Logansport, "
Frank P. Goss.....Columbus, O.
F. Converse.....Florence, "
C. F. Branch.....Pomeroy, "
Mrs. E. M. Leland.....Vincennes, Ind.
J. Kimball.....Cincinnati, O.
W. Fellows..... " "
H. Williams..... " "
E. T. Gilliland..... " "

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S. S. Carter.....Concord, N. C.
A. G. Taylor.....Wilmington, N. C.
Geo. H. Curtiss .....Chattanooga, Tenn.
Geo. Sandoe.....Abingdon, Va.
G. A. Gusten.....Augusta, Ga.
R. J. McCarty..... " "
R. F. Campbell..... " "
Sam'l Bracken, Jr..... " "
W. J. Westervelt.....Berzelia, Ga.
J. S. Hogan.....Orangeburg, S. C.
S. D. Sledge.....Aiken, "
P. H. Ward.....Marion, "
C. A. Garland.....Rome, Ga.
J. W. Brewster.....Magnolia, Miss.
Samuel Hopping..... .....Madison, "
J. C. Oates.....Moskow, Ky.
D. Sims.....Whistler, Ala.
W. S. Cassell..... . .....Frankfort, Ky.
J. W. McEwen..... " "
J. H. Bright.....Farmerville, La.
Thomas Curry.....Monroe, "
Max Elser.....Shreveport, "
C. S. Kirtland.....Bryan, Texas.
C. J. Ballard.....Groesbeck, "
J. R. Hooper.....Mexia, "
W. T. Stone.....New Orleans, La.
C. H. Ingalls.....Austin, Nev.
H. P. Downer..... .... Oroville, Cal.
W. G. Wilkie.....Reno, Nev.
J. H. Morland..... " "

TRANSFERS.

	From.	*To.*
Ida H. White,	145 B'way, N. Y.....	Brooklyn, L. I.
B. Deklyn, Jr.,	Long Branch, N. J...	Claflins, N. Y. City.
W. Crevers,	" " ..	St. Nicholas Hotel, do.
Jas. W. Mead.	" " ..	21 Wall St., do.
N. R. Brennan,	145 B'way, N. Y	Madison Square, do.
E. M. Fink,	6th ave & 34th st., N.Y.	145 B'way, do.
E. P. Wortman,	Cotton Exchange, "	" do.
S. L. Welp,	Grand Cen'l Hotel "	" do.
M. E. Lewis,	134 Pearl street, "	Newark. N. J.
H. O. Witchen,	Madison square "	B'way and 6th ave.
J. E. Morowski,	Lebanon Springs,....	Castle Garden.
C. T. Raymond,	145 Broadway.....	Earles' Hotel
H. E. Crowell,	Earles' Hotel.....	30th street.
Geo. H. Sawyer,	Portland, Me.....	Boston, Mass.
J. C. Robinson,	Newport, R. I.....	"
E. C. Cooke,	Norwich, Conn.....	Worcester, Mass.
Geo. W. Leet,	Boston, Mass.....	Burlington, Vt.
E. J. Davin,	Newport, R. I.....	Boston, Mass
W. M. Mallett,	Sharon Springs, N. Y..	Syracuse, N. Y.
W. J. Guilford,	Utica, N. Y.....	Rochester, N. Y.
F. B. Knight,	Chicago, Ill.....	New York.
F. E. Bowen,	"	Louisville, Ky.
D. T. Barry,	"	New Orleans, La.
Edgar L. Todd,	Kansas City, Mo.....	Fort Scott, Kansas.
C. W. Glarhart,	Bitter Creek, Ky.....	Salt Lake City.
J. L. Kneezelle,	Oil City, Pa.....	Parker's Land'g, Pa.
W. A. Irwin,	Pittsburg, Pa	Shamburgh, Pa.
A. J. Mereness,	Bay City, Mich.....	Chicago, Ill.
Annie Wright,	Grand Rapids, Mich....	E, Tawas, Ill.
J. H. McGuire,	Indianapolis, Ind.....	St. Louis, Mo.
C. G. Cox,	Alleghany Springs, Va..	Lynchburg, Va.
J. W. Alvis,	Yellow Sulphur Sp., Va..	" "
B. F. Dillon,	Lake City, Fla..... ...	Augusta, Ga.
O. D. Parker,	Blackshear, Ga....	Tebeanville, Ga.
M. S. Harris,	Tebeanville, Ga.....	Brunswick, Ga.
J. B. Allen,	Baton Rouge, La.....	Magnolia, Miss.
J. P. Morrison,	Delhi, La....	Meriden, La.
Jas. W. Hudson,	Meriden, La.....	Delta, La.
A. T. Latt,	Delta,.....	Farmersville, La.
A. S. Strong,	New Orleans, La.....	Philadelphia, Pa.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Nov. 26, 1872.

On and after December 9th *Lincoln, Neb.*, will be added to the list of money order offices in R. C. Clowry's district.

G. H. MUMFORD, *Vice-Pres't.*

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
December 1, 1872.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular.

GENERAL INFORMATION.

Tensas, Ala., closed.
Business for Saybrook Point, Conn., should be sent and checked as directed in tariff book. It is another line office.
French Village, Ill., re-opened.
Cornland, Ill., re-opened.
Rossville, Kansas, closed,
Hereafter business for Carondelet, and So. St. Louis, Mo., will be checked to St. Louis, Mo., at St. Louis rate.
Business for Lincoln, Neb., now a W. Union office, should be sent via. Atchison, Kansas, and not to Plattsmouth, Neb,, as formerly.
Wells, Nev., is now a W. Union office, erase other line tariff.
Bay-de-Verte, N. B., closed.
Westport, N. Y., closed.
Messages for Tappantown, N. Y., may be taken and sent to Sparkill, N. Y., from which office they will be delivered. Charges for delivery one dollar.
Emerald, O., closed.
Hereafter the tariff to Avenue Drove Yards, Pa., will be same as tariff to Philadelphia, Pa.
The office at Tionesta, Pa., will hereafter be checked as another line office, "tariff for other lines" 25, 2, 140 Oil City, Pa.
Yatesville, Pa., closed.
Bangor, Pa., is now a W. U. office. Square 52.
Bristol Ferry, R. I., P. O. A. is Portsmouth, R. I.
Tiverton, R. I., re-poened. Check Fall River, Mass,

NEW OFFICES.

324 Carpenters' Station, Ala.
294 Pelham, Ala.
256 Plainville, Ga.
298 Bloom, Ill.
337 Edinburgh. Ill.
327 Mahomet, Ill.
299 Ellsworth, Ind.
289 Otterbien, Ind.
367 Eldridge, Iowa.
376 Hopkinton, Iowa.
376 Strawberry Point, Iowa.
367 Wyoming, Iowa.
230 Clyde, Mich.
230 Portsmouth, Mich.
57 Earlville, N. Y.
Greenpoint, L. I., N, Y. tariff same as Brooklyn, L. I., check Brooklyn,
92 Ira, N. Y.
36 North Hoosick, N, Y.
65 Union, N. Y.
222 Catawba, O.
181 Caywood, O.
181 South Olive, O.
66 Hauto, Pa., check Nesquehoning, Pa.
140 Karns City, Pa.
59 Landenburg, Pa.
94 Mt. Union, Pa.
112 Roaring Springs, Pa.
510 McKinney, Texas.
484 Riverside Texas.
480 Troupe, Texas.

OFFICES HAVING "SPECIAL SHEET A."

Will hereafter check Bay View Mass., same as "Special rate" to Gloucester, Mass.

HALF RATE messages may be taken for, and received from all offices in squares 509, 510 and 511.

ATLANTIC CABLE BUSINESS.

We are informed that messages for China and Japan, *unless specially addressed "Via Russia,"* will be forwarded from London by the Falmouth or Teheran routes. If parties therefore desire to avail themselves of the lower tariff "Via Russia," the indication of route must be charged between America and London or France and sent forward with the message. The above is an exception to the general rule by which "meseages are forwarded by the cheapest route unless specially directed by another."

Some explanation seems to be necessary in relation to the rate and route of business to and from offices of the Montreal Telegraph Company in New York State. The offices referred to have the abbreviation "Mont. Co." printed in the "Remarks" column opposite their names. Business for these offices may be sent *via.* different routes, as explained in tariff book, first paragraph, page 6 of instructions. The route and rate given in the tariff book, opposite the name of the office, although that through which most of the business properly flows, may, in other cases, be the most indirect and expensive. If this appears to be the case, then one of the other routes should be taken.

For example: The tariff book gives "Potsdam, N. Y., 25 and 1, Montreal Junc., Mont. Co." A message for Potsdam originating at any point West of Oswego should not be sent *via.* Montreal Junc., although rate *via.* Montreal Junc. is given in the tariff book. The paragraph referred to in the instructions says that business for this office, (as well as any other on the Montreal Company's lines in N. Y. State,) may be sent *via.* Oswego, Whitehall, or Montreal Junc.

The tariff book also directs that the *most direct* route given shall be taken. In this case Oswego and *not Montreal Junc.* is the most direct route.

WM. ORTON, *President.*

BORN.

FALLS—At Philadelphia, Pa., October 13, 1872, to Z. P. Falls, a son, weighing fourteen pounds.

LAKIN—At Winchester, Ill., October 29, 1872, to W. T. Lakin, Operator, St. L. V. T. H. and I. R. R., a son.

MAYES.—At Bloomington, Ind., Nov. 11, 1872, a daughter to T. A. Mayes, Manager W. U. Telegraph office.

MOORE—At Philadelphia, Pa., September 23, 1872, to Charles Moore, a daughter.

MCDONALD—At Antigonish, N. S., to Hugh McDonald, Telegraph Repairer, twins, boy and girl, weighing at their birth, fourteen and sixteen pounds. respectively

MARRIED.

CAHOON—HINCKLEY.—In the Episcopal Church at Wood's Hole, Mass., Nov. 13, 1872, by Rev. Hiram Carleton, Alden F. Cahoon, of Plymouth, to Rebecca L. Hinckley, operator W. U. Telegraph office, Wood's Hole.

CLEWELL-RHOADS—At Bethlehem, Pa., October 17, 1872, in the Moravian Church, by Right Rev. Bishop Edmund De Schweinitz, Oliver A. Clewell, Chief Operator, L. V. R. R., and Manager W. U. Tel. Office, South Bethlehem, to Miss Hattie A. Rhoads, of SouthBethlehem.

EARLE—HADLEY.—At Port Mulgrave, N. S., Nov. 5, 12, 78W. E. Earle, of the N. Y., N. F. & L. Telegraph Co., at Port Hastings, C. B., to Miss E. P. Hadley.

HAGENBUSH—HEIST.—At Allentown, Pa., Nov. 2, 1872, by Rev. Mr. Fliehr, Thomas H. Hagenbush, operator W. U. Telegraph Co., Scranton, Pa., to Miss Ida S. Heist, of Allentown.

LAWRENCE—TALLMAN.—At the residence of the bride's parents, First Place, Brooklyn, L, I., Nov. 13, 1872, by Rev. Henry Ward Beecher, Fred. H. Lawrence, Supt. of Telegraph, L. I. and G. R. R., of Lawrence, Kan., to Miss Mary L., daughter if Geo. C. Tallman, Esq.

MARTIN—PRICE.—At St. Mary's Church, Colmar, Ill., Oct., 1872, by Rev. E. T. Corfield, Ira O. Martin, agent and operator, C. and A. R. R., Godfrey, Ill., to Miss Mattie A. Price, of Colmar.

RHOADS—GILMAN.—At Bement, Ill., Oct. 29, 1872, by Rev. Mr. Fortune, E. Rhoads, operator T. W. and W. R. R., Litchfield, Ill., to Miss Laura E. Gilman, of Bement.

SPELLMAN—TENNERY.—At De Graff, O., Oct. 29, 1872, by Rev. A. G. Telford, T. L. Spellman, operator and assistant agent at Forest, O., to Miss Sate Tennery, of De Graff.

STANTON—HILL.—At Leverett, Mass., Nov. 13, 1872, by Rev. Geo. Colesworthy, Lowell M. Stanton, station agent, N. H. and N. R. R., and manager W. U. Telegraph office, Granby, Conn., to Miss Mary A. Hill, of Leverett.

TRITES—HADLEY.—At Port Mulgrave, N. S., Nov. 5, 1872, W. P. Trites, manager W. U. Telegraph Co., Monroe, La., to Miss Ray Hadley.

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TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

DEATH OF C. H. BAKER, E. A. HANVEY, AND T. J. ELLIOT.

Assessments Nos. 34, 35 *and* 36, *Issued Nov.* 25, 1872.

But once before in the experience of our Association have we been compelled to announce the death of three members at a single call. The Western Union Telegraph Company, with a liberality it has shown to us in various ways, then assumed one of the assessments. With our five years' experience we can now bear the burden alone. Let remittances be prompt and cheerful, and, as far as possible, in compliance with the subjoined notice to members.

Assessment No. 34.—Certificate No. 1,218, dated September 5th, 1871. Charles H. Baker, bookkeeper, P. & A. Line, Baltimore. Died October 26, 1872, from paralysis of the brain.

Assessment No. 35.—Certificate No. 1,547, dated April 12, 1872. E. A. Hanvey, formerly operator in the Western Union Office, Rochester, N. Y. Died November 4, 1872, from typhoid fever.

Assessment No. 36.—Certificate No. 940, dated September 6, 1870. T. J. Elliot, telegraphic engineer and instrument maker, Philadelphia. Died November 13th, from congestion of the brain.

These deaths call upon all holders of certificates, up to and including 1,676, for a remittance of *three dollars.*

A. S. Brown, *Treasurer.*

Notice to Members.—The following gentlemen have kindly consented to act, and have been duly authorized as agents of the Association, in the sections in which they reside. Additional agents will be named soon :

J. Merrihew, Philadelphia.
D. C. Hinsdale, Indianapolis.
J. J. Fowler, Memphis.
F. A. Armstrong, Cincinnati.
W. C. Long, Chicago.
J. M. Crowley, Augusta.
Wm. Sanford, Mobile.
D. L. Pike, Syracuse.
M. Marean, Washington.
A. Hunter, Toronto.
J. P. Cassidy, St. Louis.
R. M. J. Paynter, Richmond.
J. W. Tillinghast, Buffalo.
C. W. Henderson, Boston.

Members will remit through them, as far as may be convenient, and avoid, as much as possible, sending small amounts through the mails. Members in large cities will continue to remit as heretofore. Agents will retain the money until the expiration of the thirty days from date of notice, when they will remit the whole by draft or otherwise.

Blank forms of application for membership, or for restoration, may be had of the agents, who will hereafter endorse them.

Members, in communicating with the Secretary, will always state the number of their certificate.

D. R. Downer, *Secretary.*

TELEGRAPHERS' INSURANCE ASSOCIATION.

The acknowledgment of receipt on any assessment is to be understood as an acknowledgment for all previous assessments.

Assessments 32, & 33.

4	6	8	13	15	17	19	25	26	27	31
39	41	43	44	49	54	55	58	65	67	69
70	71	74	75	77	78	80	82	83	89	91
93	95	97	99	100	101	104	106	107	108	111
120	121	126	127	136	138	139	140	143	146	154
156	158	160	162	164	171	175	178	179	181	182
189	190	191	193	197	198	200	206	213	215	225
228	230	232	233	238	239	242	246	247	248	256
258	267	271	273	274	275	280	288	294	303	311
323	328	330	332	347	350	353	357	359	360	364
366	367	371	372	376	379	381	382	388	389	391
392	393	398	402	405	413	414	418	422	425	428
429	431	441	451	453	455	456	457	458	466	467
468	469	470	471	474	475	478	481	482	483	484
494	496	497	499	500	503	504	505	506	511	512
514	515	527	532	552	554	555	561	566	570	573
575	576	584	587	590	594	597	600	602	603	604
605	615	618	627	628	629	630	632	642	648	649
656	659	661	670	671	676	684	690	692	694	700
701	710	711	712	715	717	723	724	725	728	730
732	733	735	737	738	740	741	743	744	772	776
778	780	790	798	799	800	801	808	809	815	817
820	822	823	869	871	873	876	880	886	896	897
899	904	905	906	908	911	912	915	920	923	927
930	941	946	949	954	955	956	957	958	959	960
963	964	977	979	980	991	992	996	998	1002	1006
1013	1026	1028	1029	1030	1031	1032	1033	1034	1038	1039
1042	1043	1044	1048	1050	1056	1057	1058	1061	1062	1066
1072	1077	1080	2085	1087	1093	1099	1100	1101	1102	1104
1109	1111	1125	1127	1134	1135	1136	1139	1142	1148	1152
1153	1163	1170	1178	1180	1182	1190	1191	1193	1194	1195
1196	1201	1204	1205	1208	1215	1218	1221	1222	1226	1227
1231	1232	1234	1235	1240	1242	1248	1256	1257	1262	1263
1265	1266	1268	1269	1270	1273	1277	1278	1279	1287	1288
1291	1296	1303	1323	1325	1328	1333	1334	1335	1339	1340
1342	1343	1344	1346	1348	1349	1350	1351	1352	1356	1360
1361	1366	1369	1375	1378	1379	1380	1383	1385	1386	1387
1388	1389	1390	1391	1393	1394	1399	1404	1406	1407	1415
1416	1417	1418	1421	1424	1425	1426	1427	1428	1433	1443
1449	1450	1452	1457	1459	1463	1475	1477	1480	1483	1485
1490	1492	1494	1498	1502	1505	1509	1510	1514	1515	1516
1519	1520	1531	1535	1537	1538	1539	1541	1543	1546	1547
1548	1549	1552	1553	1555	1556	1559	1560	1561	1563	1564
1565	1569	1572	1573	1576	1577	1578	1581	1582	1584	1585
1586	1590	1593	1494	1599	1600	1601	1604	1605	1606	1607
1608	1610	1611	1612	1614	1617	1619	1620	1621	1622	1624
1625	1631	1632	1633	1635	1638	1640	1641	1643		

Assessments 34, 35 & 36.

2	16	23	25	46	76	80	86	113	131	133
145	157	188	210	211	247	269	286	301	312	316
341	344	346	349	383	416	526	546	552	564	600
626	672	708	715	721	722	735	740	742	758	803
812	821	829	832	870	880	916	943	966	976	998
1072	1081	1125	1126	1143	1147	1154	1178	1199	1207	1225
1252	1266	1276	1298	1300	1345	1357	1368	1398	1409	1412
1429	1484	1524	1558	1568	1571	1615	1623	1629	1630	1649
1678										

Telegraph Promotion.—We learn that Mr. A. B. Smith, one of the senior operators in the office of the Montreal Telegraph Company at Hamilton, Ont., has received the appointment of Deputy Inspector of offices and removed from Hamilton to Toronto. The appointment was only known to his colleagues in the office Saturday morning, but with their usual rapidity of movement a committee of the whole arranged to entertain him at a supper that evening, and the affair came off at 8.30 P. M., so as to allow all connected with the office to be present. Mr. Black, the Manager of the office, presided, and on his right sat the guest of the evening. From the remarks of the chairman and other speakers, we gather that Mr. Smith has been about eleven years in the company's service—the last three having been spent in Hamilton. He leaves this office with the best wishes of all the employes, who, while regretting his departure, rejoice in his promotion.

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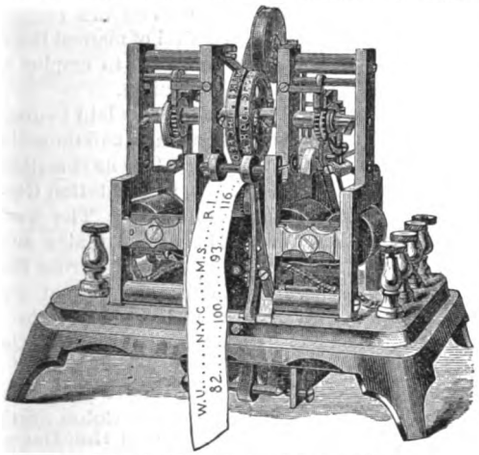
JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 2. NEW YORK, DECEMBER 16, 1872 WHOLE NO. 123.

GOLD AND STOCK REPORTING INSTRUMENTS.

For a long time prior to 1866 those engaged in buying and selling gold and stocks in the New York Gold and Stock Exchanges realized the inconvenience attending the procurement of the prices ruling in the market at a time when they were unable to be present. The only means they had for obtaining them at their offices was through messengers. It can readily be seen how unsatisfactory and unreliable quotations were when obtained in this manner. At a period of excitement in the market, with prices fluctuating at almost every bid, the figures brought by the messenger were frequently very far from those ruling at the moment of his arrival at the office, and yet this was the best that could be done.

Early in 1866, Mr. S. S. Laws brought out an instrument for reporting the fluctuations of the gold market, which was adopted by the gold exchange to announce to its members at the Board the official prices. The instrument worked satisfactorily, and



THE CALLAHAN STOCK PRINTER.

was soon after introduced into the offices of various members of the Board; and, as the instruments in each office were in the same electrical circuit with the recorder at the exchange, each change exhibited upon that instrument was shown at every office.

The Laws' machine worked upon the step by step dial principle. It had no index or pointer, but the dials themselves were rotated. There were three dials to each machine, each dial being worked by a separate and independent magnet. There were also three wires, one for each magnet. These dials were in the form of wheels, the rim of which only was in view. Upon this rim were placed numerals; upon the two first the simple figures from 1 to 0; upon the third was all the fractions by eighths, from $\frac{1}{8}$ to $\frac{7}{8}$.

Upon the operator's desk at the exchange were three keys for opening and closing the circuit, each key being connected to one of the wires; and as many times as the operator broke and closed the circuit with either of the keys, just so many steps would the dial operated by it be moved, each pulsation carrying the dial forward one step, disclosing to view the figure in order.

In order to see how the right quotation would be made, it will be necessary to understand that the dials are set at zero. The quotation may be called 39¾. The operator breaks and closes the circuit with the first key three times. This causes the first dial to rotate three steps, leaving the figure 3 in view. With the second key he breaks and closes nine times. This causes the second dial to move nine steps, leaving the figure 9 in sight; then with the third key he makes six pulsations, which stops the third dial at ¾; and, as the dials are placed side by side, the whole figure 39¾ is made. Each subsequent change would be made by sending pulsations sufficient to carry the dial to the desired position, when the required figure would be displayed.

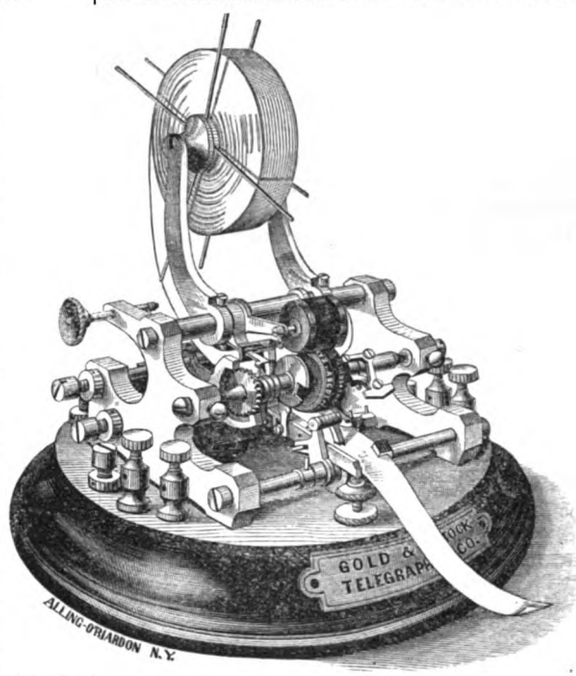
The operation of this machine was entirely visual, no printed record being made for reference.

The success of this instrument being assured and the results obtained being so great, many busy minds at once became engaged in perfecting a machine which would report the quotations of the stock market. In this, however, it was necessary to have a printed record. The large list of securities dealt in utterly precluded the use of a visual telegraph; as, in order to keep the names and quotations in proper shape, a separate dial instrument, with three wires to each, would be necessary for each stock called. One can imagine the appearance a broker's office would present with from fifty to one hundred of these dial instruments, with their 150 to 300 wires therein.

In 1867, Mr. E. A. Callahan, then an operator employed by the Western Union Telegraph Company at New York, invented an instrument, operated with three wires, which exactly filled the requirements. A company was formed which speedily introduced them. In this instrument, although the results obtained were different, there were some points which apparently infringed upon the invention of Mr. Laws, and litigation became probable. To prevent this, the rival interests were merged into one, and a new company was formed under the name of the "Gold and Stock Telegraph Company." This Company employed the Laws Instrument to report gold quotations and the Callahan to report stocks.

The accompanying cut presents an accurate illustration of the Callahan instrument as now used.

This instrument has been greatly improved since its introduction; the principal feature being that the main current now entirely controls the action of the receiving instrument, instead of, as formerly, repeating the pulsations by means of a local battery in each office. The construction and operation of this instrument is very simple so that only a very brief description of its parts and manner of working will be necessary to enable the reader to fully understand the principle. As before mentioned, three wires are employed—one each for two electro magnets engaged in moving two type wheels, and one to effect the printing. Upon one of these type wheels are all the letters of the alphabet and upon the other all the units of figures and the fractions by eighths. These type wheels are upon different shafts, but placed side by side; beneath them is a ratchetted pad carrying a narrow strip of paper from a continuous roll. This pad is upon a lever, upon one end of which is an armature, which is, at the will of the operator, attracted by a third electro magnet, connected to the third wire. The movement of the type wheels is effected in precisely the same manner as that of the dials of the Law's in-



UNIVERSAL STOCK PRINTER.

strument, they being moved step by step, each step bringing a new letter or figure forward, and upon the desired one being arrived at, an impression is taken. At the operator's desk is placed a series of metallic points, arranged in a circle. There are two of these, one for each of the wires which control the movement of the type wheels. These points correspond in number and in position with the letters and figures upon the type wheels, and are marked for the convenience of the operator, with letters or figures in the same rotation. Within this circle is placed a moveable arm so arranged that the operator can close the circuit by contact with the metallic points. As these points correspond with and control the movement of the type wheels through the action of the electro magnets, it will be plain that at what-

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ever point the operator allows the contact to become permanent, the letter upon the type wheel corresponding to the metallic point being brought to the desired position, it is firmly held, and upon closing the circuit of the third wire the pad is thrown against the wheel and the paper receives an impression of the letter.

The operation of this instrument can now be easily understood from the following description. The Stock to be quoted may be called Western Union Telegraph, and the price eighty-two. In order to economize time the names of the stocks are abbreviated as much as possible, the abbreviations being of such nature as to be unmistakable and readily understood.

To report the quotation of this stock the operator brings the movable arm in the centre of the first circle of metallic points, to the point marked W., being careful to make perfect contact with the intermediate points, so as to ensure by the successive impulses of electricity, the rotation of the type wheel to the proper position. The stoppage of the arm causes the wheel to become, as it were, locked. The circuit of the third wire is then closed, and the paper is brought against the letter and an impression taken. The arm is then carried to a point corresponding with the stop or period upon the type wheel, which is similarly impressed upon the paper, and is then taken to the point representing U., and then again to the stop or period, impressions being had in each case. Thus far the name W. U. is recorded. The movable arm within the second circle of points is now rotated under similar conditions to the point corresponding with the figure 8, upon the second type wheel, and then to the point representing 2, and, impressions being taken, the whole quotation stands recorded upon the paper, "W. U. 82." The types are inked by an ink roller which rests upon the type wheel and which is rotated by the friction caused by the motion of the latter.

A large number of instruments for reporting purposes have been brought out from time to time, all of which, of any value, are owned by the Gold and Stock Company. One of these instruments, the "Universal Stock Printer," is used upon several of the circuits operated by that company. The operation of this instrument is, like the Laws and the Callahan, upon the step by step principle, but in no other particular, except that two type wheels are employed, is there any resemblance. With this, two wires only are necessary, one to operate the two type wheels and the other to effect the printing. By a peculiar arrangement the type wheels may be shifted so that one magnet will control both.

We present upon the preceding page an exact illustration of the Universal Stock Printer, as now operated.

This instrument works on two wires, and performs two operations, to wit: Rotation of the type wheel and the impression of the letter.

One electro magnet with an armature secured to a double-toothed lever, acting on a toothed wheel, rotates the type wheels step by step. This magnet is placed on one wire, and is called the type wheel magnet.

Another magnet, acting upon an armature secured to the printing lever, effects the impression of a letter, shifting of the type wheels and feeding of the paper. This magnet is placed within the second circuit, and is called the printing magnet.

There are two type wheels, one having letters, the other having figures and fractions. Both wheels are immovably fixed upon a tube which slides endwise upon the shaft carrying them. These wheels are carried around with the shaft by a pin placed in a notch of an arm secured to the shaft. This arm is called the "crook piece." The shifting mechanism is also secured to this arm.

The shifting of the type wheels is effected by rotating them to a point where the shifting lever is directly over the shifting pins, extending upwards and secured to a plate upon the side of the printing lever, the upward motion of which throws the type wheels over to one side or the other, according to the shifting lever over the pins. In shifting the type wheels the shifting lever is so adjusted in relation to the characters upon the type wheel that when they are rotated to the dot after the "&," and the printing lever raised, the figure wheel will be thrown into a position to be printed from; and when the type wheel is rotated to the dot next to the letter "A," and the printing lever raised, the letter wheel will be thrown into a position to be printed from, a brass shield on each side of the pad preventing the type wheel which is not being used from coming into contact with the paper.

The type wheels are provided with a notched disc, which rotates with them. Upon the left side of the printing lever is an arm having a V shaped point. This, in conjunction with the notched disc, is used for the purpose of locking the type wheels to the side to which they may have been shifted, and prevents them from jarring out of position when they are being rotated. There are but two points where the type wheels are free to move either way, which are when they are at dot, and in a position to be shifted, and when the notch in the disc is opposite the V shaped arm.

This instrument is also provided with mechanism whereby any number of them in a circuit may be brought to a given point by the transmitting operator.

This is done by turning the transmitter four times around without printing, when an arm working in a worm or screw upon the type wheel shaft is carried in the path of a pin, stopping all the type wheels at the dot next to the letter A. By closing the printing lever circuit the arms are all thrown away from the stop pin, and the type wheels are free to move.

In operating these systems it is important that when the required amount of battery necessary to work each circuit is established, to maintain the same power of current so long as the operation is continued.

The amount of battery required to work each instrument (after enough battery has been put on to overcome the line resistance) is two carbon cups when the type wheels are rotated at a speed not exceeding 18 revolutions per minute; two and one-half cups when the speed is between 18 and 30; and three cups when the speed is not more than 42 revolutions per minute; or, in other words, to increase the speed of the instruments you must increase the battery power. The proportionate increase of speed and battery will in most cases be as above.

COMPLETION OF THE WEST INDIA AND PANAMA TELEGRAPHS.—MAGNITUDE OF THE ENTERPRISE.

The completion of the West India and Panama Telegraphs, which was commenced by Sir Charles Bright in 1870, brings the West Indies, Central and South America into telegraphic connection with the United States, and through them, with all countries where telegraphic systems are in existence.

The cable sent out for this arduous undertaking was 3,600 miles in length, weighing upwards of 8,500 tons, and was divided between seven large vessels, and the magnitude of the enterprise, which included the laying of sixteen separate cables under greatly varying depths and conditions, and in several cases during rough weather is unequalled in the annals of telegraphy.

Many difficulties had to be overcome, especially in laying the shore ends, and providing land lines through dense forests, while the deleterious nature of the climate led to a loss of a number of the staff.

Owing to the irregular character of the bottom, varying from two to upwards of 2,000 fathoms, four types of cable had to be employed, the first or shore end, weighing sixteen tons to the mile, and the other respectively five tons, 2½, and 1¼, the last being covered with galvanized homogenous iron wire akin to steel. The shore end cable has two massive coverings of galvanized iron wire laid spirally in opposite directions, and all the kinds of cable are further covered with two servings of yarn and Bright and Clark's compound as a protection against the teredo navalis and other marine insects.

The cables unite Havana at one end of Cuba with Santiago, and Santiago with Jamaica, whence they extend on the one hand to Colon, and on the other to Demerara, linking up Porto Rico, St. Thomas, St. Kitts, Antigua, Guadeloupe, Dominica, Martinique, St. Lucia, St. Vincent, Barbadoes, Grenada, and Trinidad.

Starting from Havana, which was previously in connexion with Florida, the line passes across the Island of Cuba to Batabano, where the submarine system commences. From this point, for about 100 miles, the cable is laid along a tortuous course in very shallow water, passing between rocky islets and coral reefs, and the coast being imperfectly surveyed previously, it was necessary to make a most careful study of the bottom, and to sound over the whole of the route to find a soft and safe bed for the cable. The type of cable used on this section being of the heavy class a great deal of manual labor was needed, and it was also requisite to employ a number of small vessels of light draught.

After passing Cienfuegos the line was laid in deep water along the Cuban coast to Santiago, and the cable was landed amid much rejoicing. The next section laid was to Jamaica, landing it at Plantation Garden River, a work of great difficulty. The west length commenced was that between Jamaica and Colon, where there is a land telegraph across the Isthmus to Panama. The line is one of great importance, and as the traffic and mails from the whole of the western coasts and South America and the central States, comprising Peru, Chili, Columbia, Venezuela, Costa Rica, &c., concentrates at Panama. Shortly after the expidition started from Colon northward, yellow fever broke out on board the Dacia; three of the cable men were buried at sea, and many others were on the sick list. The weather became bad, preventing observations, when about 300 miles from Colon a fault was discovered a short distance from the ship, and in endeavoring to pick it up an accident happened, and the end of the cable was lost. Rough weather followed, and interfered with grappling observations. Upon the return of the Dacia to Kingston a number of the cable staff died from yellow fever, and many others had to be invalided home; and as it was in a bad season of the year for grappling work, it was decided to go on with eastern sections, and then return to the Colon line.

The next length completed was between the islands of St. Thomas and Porto Rico, and in succession the rest of the lengths were laid down to Demerara, where, owing to the shallowness of the approach and the liability to ships anchoring over the route, the unusual length of 35 miles of the heavy shore-end cable was submerged, partly from schooners, as the steamer's draught was too great to allow her to approach within 10 miles of landing-place.

The cable which had been lost between Colon and Jamaica was picked up by Sir Charles Bright on the 11th inst., from a depth of 1,400 fathoms, in latitude 13.58, longitude 7.82. It was then joined up to Jamaica, and the whole of the lines are now in working order.

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INSULATOR TESTS.

In a test of glass insulators of the Compromise pattern, where the tie wire is attached to the center of the insulator, after one year's exposure and during a heavy rain, the resistance per insulator was found to be 4,030,000 ohms; and during a heavy fog 11,000,000 ohms.

In a test of glass insulators of the new Western Union pattern, after an exposure of one month, tested during a thirty-six hours' rain, the resistance per insulator was found to be 49 megohms.

In a test of the Pond insulator, under the same circumstances, and with a similar exposure, the resistance per insulator was found to be 850 megohms.

A test of the same glass insulators, after a forty-eight hours rain, showed a resistance of 30 megohms per insulator, and Pond's insulator, under the same circumstances, gave 525 megohms per insulator.

INSULATION TEST OF WIRES EXTENDING FROM LOUISVILLE.

Wire open at	*Mileage resistance in ohms.*	*Remarks.*
Cincinnati	1,900,000	Weather rainy; Glass & pin insulators.
"	2,100,000	" " " " "
"	3,000,000	" " " " "
"	2,000,000	" " " " "
Nashville	999,000	" "
"	943,000	" " Square glass "
"	2,645,000	" " " " "
Bowling Green	467,400	" " " " "
"	1,550,300	" " " " "
"	1,938,000	" " " " "
"	2,736,000	" " " " "
Cincinnati	946,000	" " Glass and bracket.
"	758,300	" " " " pin.
"	1,160,000	" " " " "
"	946,000	" " " " "
Memphis.....	2,387,000	" " " " "
Nashville.....	1,500,000	" " " " "
"	1,700,000	" " " " "
"	2,900,000	" " " " "
Cincinnati.....	1,000,000	" " " " "
"	700,000	" " " " "
"	625,000	" " " " "
"	470,000	" " " " "
Bowling Green	1,200,000	" " Sq. glass insulators.
"	1,900,000	" " Glass and bracket.
"	750,000	" " Sq. glass insulators.
"	800,000	" " " "
"	700,000	" " " "
"	400,000	" " " "
"	600,000	" " " "
"	1,500,000	" " Glass and pin.

Test of the resistance of the wires in the Second District, Southern Division. Weather clear and dry.

Wire.	*Distance, Miles.*	*Mileage Resistance of Wire. Ohms.*	*Description of Wire.*
A.....	.... 81....	....14.9..	No. 8 Galvanized (American.)
B	....208....	.... 13.9....	" " "
C	....131	....13.0....	" " "
D.....	....208....	....14.6....	" " "
E	.... 81....	....17.5....	No. 8 Galvanized (English.)
F	....208....	....17.6....	" " "
G	....113....	....16.6....	" " "
H	.... 96....	....17.2....	No. 8 Plain (American.)
I.....	....177....	....16.8 ...	" " "
J.....	....131....	....16.8....	" " "
K.....	....113....	....19.6....	No. 9 Galvanized (American.)
L.....	.... 81....	....21.2....	No. 9 Plain.
M.....	....124....	....23.0....	" "
N	....131....	....19.8....	" "
O	....113....	....19.5....	" "
P	....208....	....22.0....	" "
Q	....114....	....18.4....	No. 9 Galvanized and Plain Mixed. Few miles No. 8.
R	.... 96....	....18.6....	No. 9 Galvanized and Plain Mixed. Few miles No. 8.

Mean mileage resistance, 628 miles No. 8 Galvanized (American), 14.11 Ohms.

Mean mileage resistance, 402 miles, No. 8 Galvanized (English) 17.32 Ohms.

Mean mileage resistance, 404 miles, No. 8 Plain (American), 16.90 Ohms.

Mean mileage resistance, 1,434 miles, No. 8 wire, 15.80 Ohms.

Mean mileage resistance, 657 miles, No. 9 Plain wire, 21.23 Ohms.

Insulation test of lines in the Second District, Southern Division. Weather rainy:

Wire.	*Mileage Resistance of Insulation. Ohms.*	*Description of Insulation.*
A	2.656.800	40 miles, pin and glass.
	2.035.000	41 " Lefferts' hooks.
A and H.	1.946.600	136 " pin and glass.
	3.592.200	41 " Lefferts' hooks.
B.....	1.665.000	20 " square glass.
	1.577.000	24 " pin and glass.
	695.000	164 " Lefferts' hooks.
D.....	1.382.000	
	1.701.000	20 " square glass.
	1,330.500	24 " pin and glass.
	958.600	164 " Lefferts' hooks.
E and H.	3.737.500	..177 " pin and glass.
F	4.064.100	
	6.083.100	208 " pin and glass.
H.....	4.452.000	.. 96 " pin and glass.
I.....	2.307.300	21 " Lefferts' hooks, 60 m. bracket
	3.893.500	and glass, 96 miles pin and glass.
	3.994 900	..177 miles pin and glass.
L.....	2.656.400	
	1.943.600	40 " pin and glass.
	1.179.000	41 " Lefferts' hooks.
L and Q..	1.560.700	58 " pin and glass.
	1.305.300	137 " Lefferts' hooks.
M.....	1.048.300	
	1.660.200	194 " bracket and glass.
P	4.064.000	.208 " pin and glass.
R.....	806,800	.. 96 " Lefferts' hooks.

Insulation and conductivity tests of wires between Pittsburg and Altoona. The insulation tests were made during a rain, which continued for twenty-four hours. The tests for conductivity were made in clear, cool weather, when no escape was detected:

No. Wire.	*Mileage Resistance Conductor. Ohms.*	*Mileage. Resistance. Insulation. Ohms.*	
	No. 9 gauge.		Brook's insulators, newly paraffined
1.....	.....22.....	1,809,288	
4.....	.....21.....	1,718,262	" " "
5	.....20.....	1,109,979	" " "
6.....	.....22.....	1,367,211	" " "
19	.....21.....	481,687	Brook's ins., put up in 1866.
20.....	.....20.....	496,465	Glass and pin.

ELECTRICITY AT THE STEVENS INSTITUTE—NOVEL RESEARCHES BY PROFESSOR MORTON CONCERNING THE INDUCED CURRENT.

From the Scientific American.

The first of a course of public lectures on electricity was recently delivered by Professor Morton, at the Stevens Institute of Technology, Hoboken, N. J., before a large and intelligent audience.

The lecturer introduced his subject with a few simple, but suggestive experiments, showing the attraction and repulsion of pith balls and gold leaf very plainly, by throwing their magnified image on the screen. He mentioned that although glass was the substance generally used as an insulator, it was not by any means perfect for the purpose, and pointed to a series of Leyden jars, which were entirely useless as a reservoir of electricity, owing to the poor insulating power of the glass.

Vacuum tubes were passed among the audience, each tube having sealed within it a smaller tube, with bulbs blown along each inch of its length; in the space between the smooth outside and the bulbed inside tube, was placed an ounce of mercury; on suddenly inverting the instrument, the mercury, in its descent, would strike against the bulbs of the inner tube, producing friction, and consequently electricity, of which the effect could be seen as a violet or purple colored light following the mercury.

The subject of electrical induction was next introduced, with a simple instrument called the electrophorus, and a Holtz machine; then followed a series of experiments with induction coils. A Giessler tube was caused to revolve rapidly by means of a small magnetic engine. When the induced current was transmitted through the revolving tube, it produced the effect of a handsome piece of fireworks. A wire, with strips of paper fastened at one end, was connected with the inner coating of a Leyden jar. On charging the jar with the long sparks of induced electricity from the induction coil, the strips of paper would be repelled and stand out from each other, but on discharging the jar they would instantly drop. A chime of bells was rung on the same principle, and would continue to ring for twenty minutes with one charging of the jar.

Professor Morton mentioned that he believed he was the first to discover that the induced or secondary current of the Rhumkorff coil was capable of producing attraction and repulsion, similarly to frictional electricity.

An electrical orrery was set in motion by the induced current escaping from points and reacting on the air; a lighted candle, held near one of the points, was almost blown out.

The speaker closed the lecture with some brilliant experiments with the large coil of the Institute. Wood was torn up and gunpowder was only scattered with one electric flash, which lasted the six billionth of a second, but ignited by another of longer duration, about six or eight hundredth of a second. The last experiment, that of causing the induced electricity to penetrate blocks of glass, was received with well deserved applause; the assistants brought in two heavy columns of glass, each having a metal rod running through its middle; thick varnish was poured on the top face of one column, and the block of glass to be penetrated placed on the varnish. More varnish was then poured on the block and the other column placed on the top. The principle was simply to bring two very well insulated electrodes together with the block of glass between them; the object of the varnish was to render the path through the glass the easiest course for the electricity. The terminal wires of the secondary coil were connected with the rods in the columns of glass. It was very interesting to observe the effect of the strange force struggling through the glass; the electricity would penetrate perhaps an eighth of an inch, and then, as if the resistance were too great, it would dart back and run around the outside of the block, turning the corners and scattering the layers of varnish; then again the current would make a new attack, penetrate deeper and deeper, until at last the bright streams of light passing entirely through the glass announced the electrical success.

The Professor exhibited a block of glass three inches thick (penetrated in this manner), by throwing the light through it and on the screen; two plainly marked cleavage lines showed the electric path through three inches of solid glass.

THE message of the President was received at the *Press* office yesterday afternoon and evening. It contains 11,335 words and was transmitted over the Western Union Telegraph wires. It commenced to come into the Troy office about 1:35 o'clock, and was all received at 7 o'clock last evening. It was taken from four wires by four operators. They deserve uncommon praise for the manner in which they did their arduous work. The message was divided into four parts at Washington, and each part lettered and transmitted over a different wire. The prompt and precise manner in which this message was received and sent out from Troy is not an exception to the general rule of the excellently managed office of Superintendent Prescott. The Treasury report made 9,000 words.—*Troy Press, Dec.* 3.

THE Delaware and Hudson Canal Company has recently completed a new line of telegraph from Carbondale, Pa., to Susquehanna, thus connecting its lines from Honesdale south with the line from Binghamton to Albany.

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CORRESPONDENCE.

HOW TO INCREASE THE CIRCULATION AND USEFULNESS OF THE JOURNAL.

To the Editor of the Journal of the Telegraph:

The Journal of the Telegraph has been a great promoter of system, and were it withdrawn we could better know its immense value to the company. It does not do every employé all the good possible, but it does behoove the company to see that every employé read the official columns pertaining to this kind of employment, yet there are hundreds of them who *do not* because they *cannot* without becoming subscribers.

The paper reaches every W. U. Manager; but in large offices there are many employés beside the manager.

In my office I had nine on the pay-roll, and to secure the end deemed desirable, I wrote upon the margin of the paper the name of every employé, requesting each to cancel his name after reading the monthly circular. The messenger boys did not fail to receive any useful information to be gleaned. I think it would be money in the company's pocket to present every employé with a copy who does not now receive one, except, perhaps, the messengers who can be provided for in the manner indicated when there is anything which the company's interest demands they should understand.

The number required to carry out this idea is not so great. The offices where there are more than two employés are those which need one or more papers, in addition to those now furnished. The District Superintendents have all the data requisite.

Many operators who now fail to read the paper, even if they get a chance, would read it. Some feel that if they must pay for information, which it is to the interest of the company they receive, the company will wait a long time before they receive it. If each can take a copy home in his pocket, I think its usefulness will increase sufficiently to defray the increased expense.

RELIEF.

To the Editor of the Journal of the Telegraph:

Some time ago in your paper was propounded the question "why are there more blanks No. 1, than No. 2, used;" etc.

There are a number of reasons.

First—Such offices as New York and St. Louis copy all *through* business on printed blanks Nos. 1 and 44.

Second—Thousands of messages emanating from railway officers are written upon other than the company's blanks, but are delivered upon No. 1 blank.

Third—The majority of small offices do not carry out the rule requiring that every message be written upon or attached to blank No. 2 or 45. This item must amount to from 5,000 to 15,000 per day.

The amount of wasted blanks No. 1, as compared with wasted No. 2, must be small—I mean sheer, culpable waste where no use is gotten out of the paper; but the amount of blanks No. 1 used everywhere is far in excess of necessity, and is one of the results of the fallacy in the minds of the employé that it makes no difference to *him*.

TRAVELER.

MANCHESTER, VT., NOV. 23, 1872.

To the Editor of the Journal of the Telegraph:

Please answer the following inquiry:

Richard Roe sends message to Boston from Manchester, with orders to have answer come back "Collect," but before said answer reaches Manchester Mr. Roe has left town and gone to New York, where he resides, but before starting directs operator at Manchester to forward the answer, when it is received there, to New York, and he (Roe) will pay all the charges in New York on delivery of message. Message to be collected on contains ten words; tariff from Boston to Manchester is fifty-five cents, and tariff from Manchester to New York is seventy cents. Query: How should Manchester make check? Please give exact wording, and oblige,

L. C. ORVIS, Manager.

Answer.—Rule 8 says:

"That in case a person leaves town before the arrival of an expected message, and it is forwarded to him, you will include as part of the message the name of the place where it originated, and the date."

Counting the date three words, the check for New York should be: "13; collect 85 and 55; *via* Manchester, Vt." Then take credit for yourself as having paid 55 cents to "other lines."

SOME SILVER LINING.

To the Editor of the Journal of the Telegraph:

Thackeray tells an amusing thing, in "Pendennis," of a book reviewer whose line of policy was a little unique. On receiving a work for review, his first move was to dispose of it at a book stall, enjoying the result of the sale, and then prepare to dispose of the book in a most summary manner. In an article in the issue of the JOURNAL of December 2d the writer pays his respects to the "Telegraphers Mutual Life Association" in straightforward phrase, if not in what seems to me a just and generous spirit. Unlike Thackeray's hero, he does so, too, in the presence of abundant information, printed in the shape of a report elsewhere in the same number of the JOURNAL. But in presuming to condemn certain things, he is as much abroad as the reviewer in question; for, if I am not in error as to the author, he has never taken the trouble to attend the meetings of the Association, and is consequently as little in sympathy with the essence of those gatherings as our English critic was in the tenor of the book which he bartered and then proceeded to "butcher"—we quote the word from Thackeray—without having so much as peeped at the sentiments inclosed within its taseful binding.

"There has got to be a radical change in the administration of affairs," says this disciple of Voltaire, "in order to enlist the sympathies and interests of those whose sympathy and co-operation it is desirable to obtain." * * * * * "In the present condition of affairs the members of the association located in the vicinity of New York, virtually control its action and policy, and while this remains no progress need be looked for elsewhere."

As well might we look over our prosperous land, behold its vast industries, its commerce and agricultural thrift, and say:—"The government at Washington must cease to be, else we are ruined." It is necessary, I think, that the association should have a central power, and why not at New York? There is no cause for alarm; the Association's strength and practicability increases with its growth, and its growth is healthful and rapid. The payments to the heirs of deceased members are prompt, and the assessments are regularly paid. The platitudes "prejudice is blind, and had much better be conciliated than opposed;" if each district, through its representatives, had a vote at the annual meeting, sectional jealousy would be disarmed," and the glittering generalities, "the present system is too loose." "Not until the whole membership, in some practical manner, has a voice and a vote, will the Association embody the entire fraternity," are singularly *in apropos*, while the agency scheme, suggested in the JOURNAL, is unworthy the attention of any thinking or judicious man.

This is the case: The Association commenced with a handful of members, and from the first the very best men obtainable have engineered its affairs. Its increase of members is so large that two men are infinitely inadequate to the emergency of transacting its business, and extra assistance is sought and obtained. The meetings are held once a year, and are attended by the very cream of the profession—by such men as A. B. Chandler, Walter Lewis, A. S. Brown, A. S. Downer—and the affairs amicably adjusted for the coming year. Moreover, the Association has an Executive Committee composed of men of pronounced integrity, to whom questions of importance arising any time during the year, are referred and acted on, to the seeming satisfaction of those interested in the Association.

In a word, the Association is moving forward, developing into a state of perfection as time wears on, and if in any particular it has not reached the meridian of its glory and usefulness, and is tarrying in the twilight, let it be remembered that it is the twilight of the morning and not of the evening.

MACQUE.

NASHVILLE, TENN., NOV. 26, 1872.

To the Editor of the Journal of the Telegraph:

Our insurance association is a good thing and doing good, but it seems as though it might, by being spread over larger field, be made more useful. The practice of the association dismemberships those who fail to pay their assessments, thus losing members, and withdrawing from many needy persons the benefit the association might otherwise do them. Many, and I believe the greater number of those failing to pay their assessments, fail through lack of money. A dollar or two to the majority in the fraternity is of no object, but where "jewels," like the Roman matron's, have been freely given, there are other and more crying wants than to pay assessments. Would it not be wise, and of more benefit to a larger number, to adopt a system in general use by life insurance companies, of issuing something of the character of a paid-up policy to those who are obliged to discontinue their membership, and so wishing, such policies entitling heirs to amounts equal to the number of assessment paying members at the time of application for a paid up policy, the amount, when necessary, to be assessed upon members holding certificates of lesser number than that of deceased, or otherwise as thought best. In case parties who had withdrawn from the association wishing to rejoin, allow them to do so without paying back dues, as now; but stipulating in such case that if it became necessary, the amount paid him should be minus, the numbers of certificates issued during the time elapsing between the withdrawal and regaining, or that payment of back dues should entitle them to some privileges, as they would be, had they never withdrawn.

To further extend the benefits of association would it not be well to allow those so desiring to take out the second certificate, that is one person holding two certificates—and limit it by two, for one person—paying assessments for both and in case of disease. The heirs to be paid double assessments, or two premiums. These ideas put into practice would probably make more clerical force necessary for keeping the accounts of the Association, but it wouldn't be much and could easily be met by light special assessment.

CERTIFICATE 1,449.

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To the Editor of the Journal of the Telegraph:

Your article in last JOURNAL, asserting a lack of interest in the Insurance Association among members in New York and elsewhere creates some surprise. If the JOURNAL would print one tithe of the letters that reach us, filled with expressions of approval and commendation, or could you hear the many words of cheer spoken to the officers, the assertion would probably never have been made.

We work quietly, without newspaper parade, and accomplish our good work in a manner satisfactory to those who most have the well being of the organization at heart. You make an error in stating the annual meeting adjourned *sine die*, unless adjourning to the next regular annual meeting is adjourning without a day. "A radical change in the administration of affairs" sounds large and exhaustive, but rather reflects on the present executive committee and officers, under whose direction comes the management. They certainly have the confidence of the forty members who usually attend the annual meeting, else their election would not be so unanimous.

I venture to say no one will question their personal fitness, or who will assert they have "an axe to grind."

In regard to moving the headquarters elsewhere, I am not opposed to it, if the majority of members desire the change. It's for them to decide, but until we are organized somewhat differently it is wise to leave it where it is.

The trouble is, we are working on too economical a basis. There is sufficient work connected with the office of secretary to occupy one man's whole time, and in order to develop the association properly provision should be made for this work. It is absolutely impossible for one who has other duties to attend to, to perform the work of secretary, even with the assistance he can get with the small allowance authorized at the last annual meeting.

The plan you suggest in regard to districting the country by states is impracticable at present. It would necessarily complicate the working machinery of the association, which must be avoided under an economical way of doing things.

The plan which has been adopted and already partially carried into operation is to appoint agents for certain sections, permitting them to form their own districts, not consulting geographical boundaries, but with regard only to the convenience of their communication with members. A district by this plan would be made up of lines of railroad and telegraph diverging from an agency. Members, after a while, would find it convenient to do all their business through an agent, instead of directly with the secretary, by which means it is hoped that his labors would be materially lessened. We will be glad if any sufficient number of members in any section would unite upon one of their number to act in such capacity, and if there is no objection he will be recognized by the officers as a regular agent.

Very explicit instructions have been sent to agents about endorsing applications. They understand that while it is desirable that the operation of the Association should be in some degree charitable, yet justice to a very large membership scattered throughout the whole country, require us to be very careful to whom certificates are issued. No one in ill health, or whom the agents think would be an unreasonable risk, or whose habits are bad, who drink habitually, or who does not sustain a fair reputation, is to be recommended.

The case you mention where a certificate was issued to an applicant in the last stages of consumption, never existed within the knowledge of the secretary and treasurer.

We may have been imposed upon in a few isolated cases during the first year or so of our history, by too kind hearted managers or superintendents approving ineligible application, but every precaution has lately been, and will hereafter be used, to protect the association from imposition of all kinds. For this reason we are trying to confine the endorsement of those applying to join us, to agents as much as possible, and already good results have come from the practice.

Herewith I send some letters, from which I hope you will make extracts for publication. They are only specimens of what we are continually receiving, and have come to us within a few days. They will help to prove that there is no lack of interest in our organization outside of New York, whatever may be thought of the practicability of the suggestions made.

D. R. D.

A communication from a member of the Insurance Association in Vermont contain some very excellent suggestions. For the protection of a member against a loss of the benefits of membership by an apparent delinquency, owing, among other causes, to the loss of remittances sent through the mail, the sender being ignorant of such loss, he says:

"My plan for doing this would be to publish all new assessiments occuring within a month on the first day of the succeeding month, allowing, as now, thirty days for payment. At the end of twenty days publish a list of delinquent certificates to that date—instead of the list of *receipts* as now—which would give *honest* and *earnest* members sufficient time in which to duplicate any remittance not received in season to avoid the penalty. Causes why not received in the first instance could be afterwards investigated and differences adjusted. To preserve the life of the association, neither deed of omission nor of commission should be allowed to jeopardize the validity of a certificate if it can be shown that the member is honest in his purpose to preserve his membership intact. Membership should be of life tenure, and such should be the clear conviction of every applicant before he assumes its obligations to the association.

The plan of district agents seem to me an excellent one, for it will remove many of the difficulties naturally arising from territorial distance from the officers of the association, and want of action and earnest co-operation of many of its members."

As to physical elegibility and the power of an endorser to abuse the confidence of the association, he goes on to say:

"Another matter seems to me of vital importance to the success of the association—the physical elegibility of applicants for membership. Do we guard sufficiently against imposition in this particular? 'Tis evident that we *have* not, if the statement of our 'Organ' is correct; and I know from personal experience that there is daily opportunity for *mistakes* to be made on the part of those whose indorsement of the applicant is taken as sufficient evidence of his elegibility. There are many influences which *might* impair the judgment of these persons, oftentimes contributing to *blindness*, preventing a clear *understanding* of, or statement of the fact. In some instance this blindness might be counted a *virtue*, charitable, and even creditable, but as a rule of the association should not there be a fixed guard against imposition? In my opinion every applicant should be required to furnish the certificate of a reputable physician that after a thorough examination he is found to be in generally good condition of physical health. Not make the test so strong as to debar the acceptance of applicants on merely technical or frivial causes, but make the elegibility of applicants so clear that the association may not be imposed upon by assuming the risks upon a life already flagging. That the association may not be charged with doing injustice to future applicants through the operation of such a rule, in that it necessitates increased expense, I would suggest that a certain portion of the 'Reserve Fund' be set apart and applied to the payment of the costs of such certificates. This would be appropriating so much of this surplus fund to the general and direct good of every member of the association in its protection against imposition."

A correspondent in Illinois, in remitting for assessments numbers 34, 35 and 36, closes his letter in the following kind and sensible manner.

"This is a pretty heavy draw on me at once, but in consideration of the good cause, I hope I am able to stand it, as none of us know how soon we may be similarly situated and have to ask the same thing. I am surprised to find as many delinquents in the association as reported. Operators are a pretty hard set to hold together in one common union without a big delinquent list. I know that by experience, but they are doing first-rate in the Life Association, and I hope that they may always do so well, and better, if possible."

Another remitter, writing from Illinois, thinks that it is

'Coming rather thick; still it is a pleasure to feel that we are assisting the needy."

To the Editor of the Journal of the Telegraph:

In the front part of the book of rules, which was superseded June 1st, 1870, was an invitation to each manager to communicate to the secretary, if any of the rules following did, in his opinion, work against the interest of the company.

In the present book this invitation does not appear. Will you please to tell *us* why it was left out?

It was, no doubt, seldom if ever acted upon, still it was a door which ought never to have been closed. It presented the *opportunity* to do good, and you can imagine how much less good would be done than is done were all palpable opportunities withdrawn.

There are men who do good without being asked, and there are those who do no good unless pointedly solicited so to do. There are also those who only lack the opportunity.

MISSOURI.

A. C. Will appear in our next. Shall be glad to receive your communications.

TELEGRAPHING BY SOUND THROUGH WATER.

In 1828 Sturm and Colladon made a series of experiments at Lake Geneva, Switzerland, to determine the rate of transmission of sound through water. The sounds were produced by striking a bell suspended from a boat at a suitable depth in the water, while the observers were stationed in another boat at a distance and received the sonorous impressions through a long metallic tube, the lower end of which was closed by a membrane and immersed at a considerable depth in the water. In these experiments the bell weighed about one hundred and thirty pounds and the sound was heard at a distance of about 14,000 yards.

During the recent siege of Paris the attempt was made to obtain telegraphic communication with the provinces by this device of transmission of sound through water, and the Minister of Public Works confided the necessary experiments to M. Lucas, who reports the following results: The experiments were conducted as in the former instance and made in the river Seine. Two bells were employed, one of about eighty pounds and the other of seven hundred pounds weight. In the case of the first the sound was transmitted to a distance of about 1,800 yards, while in the case of the second or larger bell only to 1,500 yards. There was, therefore, no advantage gained by the increase in the size of the bell—in fact there was a loss. The great diminution in the distance to which the sound was conveyed in his experiments is accredited by M. Lucas to want of depth in the waters of the Seine as compared with those of Lake Geneva.—*Nature and Science; Scribner's for December.*

MARANZONI and Stefanelli have discovered that a film of an essential oil on the zinc plates of a voltaic pile has an effect similar to that of amalgamation, preventing local action to a certain extent. It diminishes the quantity and intensity of the current at the commencement of the action, rendering it for a certain time more constant, but stopping it entirely after two or three hours. In like manner the evolution of hydrogen by the action of zinc on dilute sulphuric acid is quickly arrested by the addition of an essential oil, but is recommenced on adding alcohol.—*Scribner for December.*

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
December 15, 1872.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular.

GENERAL INFORMATION.

Haywards, Cal., closed.
Monitor, Cal., closed.
Oakland, Ill., changed to Ray, Ill.
288 Clarke, Ind., is in Lake Co.
Moore's Hill, Ind., re-opened.
Geneva, Ind., closed.
Newport, Wayne Co., Ind., closed.
Patriot, Ind., closed.
Rising Sun, Ind., closed.
Shiedler, Ind., closed.
Alpine, Iowa, changed to Cliffland, Iowa.
Lisbon, Me., closed.
Lincolnville, Me., closed.
Georgetown, Mass., closed.
Business for West Springfield, Mass., should be checked to Mittineaque, Mass.
Plympton, Mass., closed.
Brandon, Miss., re-opened.
Newton, Miss., re-opened.
Gower, Mo., closed.
Junction Ranche, Mon., closed.
Athens, N. Y., closed.
Aurora, Nev., closed.
Wellington's, Nev., closed.
Liberty, Guernsey Co., O., closed.
Cunningham, Pa., changed to East Brady's Bend, Pa.
Lehigh Colliery, Pa., the P. O. A. is Shenandoah, Pa.
Hereafter, business for Sugar Notch, Pa., will be checked to Wilkesbarre, Pa., at Wilkesbarre rate.
Darby, Pa., re-opened.
Ridley Park, Pa., re-opened.
Pumphrey's. W. T., closed.

NEW OFFICES.

293 Hartsells, Ala.
275 Scottsboro, Ala.
285 Warrior, Ala.
* Higganum, Conn..... 30 3 32 Hartford, Conn.
* Rocky Hill, Conn..... 30 3 32 Hartford, Conn.
* Molino, Fla.....100 10 305 Pollard, Ala.
336 Compton, Ill.
298 Crete, Ill.
329 De Soto, Ill.
336 Paw Paw, Ill.
346 Rock Falls, Ill.
336 Shabbona, Ill.
290 Clark's, Daviess Co., Ind.
509 Red River, Ind. Terr.
426 Carlisle, Iowa.
426 Indianola, Iowa.
426 Wintersett, Iowa.
503 Safford, Kansas.
264 Horse Cave, Ky.
310 Nortonsville, Ky.
13 Etna, Me., check Newport, Me.
18 Stoughton, Mass.
179 Caseville, Mich.
331 Booneville, Miss.
362 Garner, Miss.
408 Griffin Crossing, Mo.
438 Houstonia, Mo.
379 St. Clair, Mo.
561 Summit, Mon.
474 Sterling, Neb.
57 Cedarville, N. Y.
92 Sterling Station, Cayuga Co., N. Y.
98 Northwest, N. C.
59 Birdsboro, Pa.
140 Greece City, Pa.
58 Herrick Centre, Susquehanna Co., Pa.
59 Kutztown, Pa.
140 Red Bank, Pa.
302 Lynnville, Tenn.
293 Prospect, Tenn.
484 Crocket, Texas.
510 Denison, Texas.
* Freeport, W. T., 50 20 Seattle, W. T., check San Francisco, Cal.
* Port Blakly, W. T., 50 20 Seattle, W. T., check San Francisco, Cal.
* Port Gamble, W. T., 50 20 Seattle, W. T., check San Francisco, Cal.
* Port Madison, W. T., 50 20 Seattle, W. T., check San Francisco, Cal.
* Port Townsend, W. T., 50 20 Seattle, W. T., check San Francisco, Cal.
Teninio, W. T.

Offices in square 180 will make the following change on their *square sheet:*

Square 1.....$2.50
2..... 2.50
3..... 2.25
4..... 2.25
5..... 2.50

Half-rate messages may be taken for and received from Molino, Fla., the new office opened on other lines.

WILLIAM ORTON, President.

CUBA CABLE BUSINESS.

Tariff and Rules for Cuba Cable Business.

This order contains complete instructions concerning Cuba Cable Business, and supersedes all previous orders relating thereto. All messages must be pre-paid.

To take effect January 1, 1873

Tariff, in Gold, Between Havana and the United States and British Provinces.

	For Ten Words.	For each Additional Word.
To or from Havana, Cuba, and any office of the Western Union Telegraph Company, in the United States, east of the Mississippi River, including St. Louis, Mo.....	$5 00	$0 40
To or from any office of the Western Union Telegraph Company, west of the Mississippi River, except St. Louis, Mo.....	7 50	0 75
To or from any office in the United States not on Western Union Telegraph Company's lines add, in gold, the local tariff of the connecting Company from the point of connection with the Western Union Telegraph Company to the point of origin or destination.....		
To or from Offices in Canada.....	5 50	0 45
To or from Offices in New Brunswick and Nova Scotia.....	6 00	0 50
To or from Offices in Newfoundland.....	7 50	0 65

Official Messages of the Spanish and United States Governments will be charged less than the above rates by $1.75 per each message of ten words or less, and eighteen (18) cents for each additional word. All such messages must be signed officially, and the prefix "G" must precede the check.

On messages to HAVANA and to the following named offices in Cuba, beyond Havana, collect, in addition to the foregoing rates, the Spanish local tariff, viz.: Forty (40) cents, gold, for ten words or less, and forty (40) cents, gold, for each additional ten words or fraction of ten words.

Batabano,	Los Palacios,
Bejucal,	Los Punas,
Bemba,	La Mulata,
Bocu Du Sagua,	Matanzas,
Bayamo,	Mariel,
Bahia Honda,	Pinar Del Rol,
Consolacion Del Sur,	Paso Real
Colon,	Puerto Principe,
Cardenas,	Remedios,
Cienfuegos,	San Antonio,
Caibarien,	Santo Domingo (Coloniado),
Cabanas,	Sagua
Ciego De Avila,	Santo Spiritu,
Cuba,	San Diego De Nunez,
Guanaja,	Trinidad,
Guainaro,	Union De Reyes,
Guines,	Villaclara.
Jiguani,	

RULES.

I. CHECK:—The check includes:
1. The number of words in the entire message.
2. The amount charged.

Great care must be taken to correctly check messages, Managers of offices will be held personally responsible for failures to observe this.

II. COUNT:—The date, address, and signature must be included in the count, and paid for. The sender is entirely responsible for non-delivery when either date, address, or signature is omitted.

Compound names of places, including names of countries, states, islands, cities, towns, etc., and compound words (as shown by standard dictionaries), will be charged as one word. Two-pence, three-pence, and up to eleven-pence, count as one word in each case.

Names of individuals, firms, vessels, streets, and all other names, count for as many words as are employed by the sender to express them.

Initial letters, decimal points, bars of division, underlines, and signs of punctuation, count as separate words; and great care must be taken to transmit them precisely as written by the sender.

Numbers in all messages, except cipher, must be written out in words. Figures are prohibited in plain and code messages, unless they are used to duplicate numbers previously written out; in which case, they are counted for as many words as are used to express them.

The sender is responsible for an insufficient address, and in no such case will inquiries as to delivery be made free.

III. CODE AND CIPHER:—CODE AND CIPHER MESSAGES ARE PROHIBITED BY THE SPANISH GOVERNMENT, and will only be forwarded at senders' risk as to delivery. If delayed or suppressed by the Government, the tolls will not be refunded.

CODE MESSAGES are composed of words found in ordinary dictionaries or gazetteers, but disarranged, or having a secret meaning.

CIPHER MESSAGES are composed of figures, letters, or words, not contained in dictionaries or gazetteers, or a combination of either, or all, constructed for secrecy.

Count *Cipher Messages* as follows:

Add together all the figures, letters, characters and signs; divide the total by five, and the quotient (plus one for the remainder, if there be any) is the number of words to be charged for as cipher.

The date, address, signature, and any other portion of the message that is written in ordinary words, whether code or plain, will be counted as in ordinary messages, and added to the number of words found in the cipher text.

One-half in addition to the ordinary rates will be charged for the whole number of words in cipher messages.

IV. REPEATED MESSAGES:—The sender of a message can have it repeated over the wires of this Company by paying a half-rate additional; in which case each receiving office will repeat to each sending office as it passes. The words "*repetition paid,*" must be inserted immediately after the address, and must be charged for.

Should the receiver of an ordinary message require it to be repeated on account of supposed error, the application for repetition must be addressed to the sending station. Such application and repetition must be treated as two distinct messages, and be prepaid. Should an error on the part of the telegraph be discovered, the charges for the application and repetition will be returned.

V. PREPAID REPLIES:—The sender of a message may prepay the reply as follows:

The sender must insert immediately after the address, the words: "*Reply, —— words, paid.*" The number of words paid for will be written in the blank space, and all must be paid for. Should the reply contain more words than the number specified, the sender of the reply, on presenting it for transmission, must pay for the excess. The reply must be tendered not later than eight days after arrival of original at delivery station.

If an answer of only ten (10) words is prepaid, it is sufficient to insert in original message: "*Reply paid.*"

In cases where more than one reply is required and prepaid, the sender must state the number of replies, thus: "*Three replies, paid;*" or, if more than ten (10) words, thus: "*Three replies, each —— words, paid.*"

VI. MESSAGES FOR POINTS BEYOND HAVANA:—All despatches to points in Cuba, beyond Havana, are required by the Spanish Government to be written in the Spanish language, and this Company will take no responsibility on such messages, if forwarded in any other than the Spanish language.

VII. MESSAGES FOR POINTS BEYOND TELEGRAPH LINES: Messages destined for places beyond the lines of telegraph, must contain instructions from the sender as to the places from which they are to be posted. Such instructions must be inserted immediately after the address, and charged for as part of the message.

Twenty-five (25) cents, gold, must be charged for postage in such cases.

VIII. COMPLAINTS:—All complaints respecting irregularity in the transmission or delivery of messages, must be made by the *sender* only, and addressed to the administration or company to which the messages are handed for transmission.

They must be accompanied—

1st. By a declaration in writing from the receiving station, or the person addressed, if the message has not been delivered.

2d. By the copy of the message as delivered, if it has been mutilated or seriously delayed.

The total charge for any message which has failed to reach its destination, or which has been seriously delayed through the fault of this company, will be refunded. All claims for refund of tolls must be forwarded to the Treasurer, New York, with the statement of complaint, as above. The tolls will in no case be refunded, without instructions from headquarters.

WILLIAM ORTON, President.

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TRANSFER SERVICE.

EXECUTIVE OFFICE, NEW YORK, Dec. 2, 1872.

From and after this date all money order offices in W. A. L'Hommedieu's district will be transferred to L. C. Baker's district.

G. H. MUMFORD, Vice-President.

EXECUTIVE OFFICE, NEW YORK, Dec. 4, 1861.

Columbus, Miss., office has been transferred from J. B. Tree's district to C. G. Meriwether's district.

G. H. MUMFORD, Vice-President.

EXECUTIVE OFFICE, NEW YORK, Dec. 12, 1872.

On and after January 1, 1873, the following-named Money Order Offices will be transfered from E. P. Wright's district to C. O. Rowe's district:

Alliance, Ohio.
Canton, "
Crestline, "
Fort Wayne, Indiana.
Greenville, Pennsylvania.
Lima, Ohio.
Mansfield, Ohio.
Massillon, "
Plymouth, Indiana.
Salem, Ohio.
Sharon, Pennsylvania.
Wooster, Ohio.

G. H. MUMFORD, VICE-PRESIDENT.

TELEGRAPHERS' INSURANCE ASSOCIATION.

The acknowledgment of receipt on any assessment is to be understood as an acknowledgment for all previous assessments.

ASSESSMENTS 34, 35, & 36.

5	6	8	13	21	28	29	37	41	42	52
56	59	60	64	67	70	72	74	75	77	91
95	98	101	107	108	121	122	134	138	143	175
176	177	183	185	186	187	199	201	202	217	220
235	240	244	245	247	254	257	267	271	273	274
275	276	277	280	288	297	319	323	333	342	351
352	357	359	361	362	364	366	367	378	380	382
392	393	394	402	405	406	413	426	434	438	441
442	459	463	464	466	467	468	469	470	471	474
475	476	478	481	508	510	514	527	536	546	547
548	554	560	562	577	579	587	594	603	604	615
618	622	626	629	630	642	646	655	662	663	664
665	667	669	684	685	695	697	701	702	705	708
714	721	725	731	734	735	769	772	789	797	798
799	800	809	815	825	832	842	848	858	869	871
873	880	886	899	904	908	911	915	917	922	923
932	938	939	949	952	966	976	980	995	998	1000
1001	1010	1013	1024	1028	1029	1038	1040	1046	1047	1054
1055	1056	1062	1069	1071	1075	1087	1088	1090	1093	1096
1111	1126	1143	1148	1149	1153	1165	1173	1174	1180	1182
1183	1190	1198	1200	1204	1205	1210	1211	1213	1221	1222
1225	1232	1245	1248	1251	1255	1256	1259	1260	1263	1271
1277	1292	1294	1295	1303	1304	1306	1307	1308	1309	1311
1312	1313	1314	1315	1317	1318	1320	1321	1322	1323	1325
1327	1329	1332	1333	1336	1339	1340	1342	1343	1344	1345
1346	1348	1349	1350	1351	1352	1353	1354	1355	1356	1358
1359	1363	1364	1365	1366	1368	1372	1376	1385	1386	1387
1388	1390	1391	1394	1400	1402	1403	1404	1406	1410	1412
1413	1419	1425	1427	1437	1438	1440	1444	1445	1449	1451
1453	1454	1455	1456	1461	1462	1463	1479	1481	1492	1494
1499	1501	1503	1504	1506	1507	1508	1515	1517	1518	1520
1522	1524	1526	1527	1531	1532	1549	1554	1555	1556	1557
1558	1559	1560	1563	1565	1566	1570	1571	1579	1580	1586
1587	1588	1589	1590	1591	1593	1594	1610	1611	1612	1613
1614	1625	1626	1635	1636	1637	1645	1650	1651	1652	1653
1656	1657	1658	1666	1670	1671					

ASSESSMENT 34. NO. 542 698
" 35. " 576

FOREIGN TELEGRAPHIC ITEMS

SUBMARINE TELEGRAPHING.

From Paris we have the announcement of a most important contribution to the Vienna Exhibition in the shape of a new method of submarine telegraphing, which leads us to expect a thorough transformation of the one now in use. The most eminent men of professional science in the branch, such as Phillipps, Spinelli, Culigny, Tosselli, and others, have pronounced favorably upon the subject; and, according to the opinion they have given, the electrical current will be rendered useless on long distances by substituting for the cable the tube of Ferdinand Tommasi, into which water is introduced, and the telegraphing performed by atmospheric pressure. A copper tube thus filled will be subjected to atmospheric pressure at one end, and the effect at the other end is instantaneous. A pressure of 250 atmospheres will be necessary for telegraphing at a distance of 4,000 kilometres, the diameter of the hollow space in the tube being 2½ millimetres. The copper tube will be incased the same as the cables now in use. Most surprising results have been shown at Paris with a length of tube of 500 metres, in the presence of practical men in telegraphic matters.

THE manufacture of the duplicate French Atlantic and Great Western cables is steadily progressing; of the former about 700 miles are already coiled on board the Great Eastern, and the electrical condition of the cable is all that can be desired.

THE new General Post Office in London is now approaching completion, and steps are being energetically taken for the transfer of the head telegraph station there; wires are being laid in every direction, and a large system of pneumatic pipes laid down.

THE Indo-European Telegraph Company have given notice that they are now again accepting messages for India, China, and Australia, their special lines *via* Teheran, interrupted by the late unusually severe storms in North Germany, having been repaired and placed in good working order again.

THE total number of messages forwarded from Postal telegraph stations in the United Kingdom, during the week ended Nov. 9th, 1872, was 211,075, an increase on the corresponding week of last year of 62,055.

STATEMENT showing the total number of messages forwarded from Postal Telegraph Stations in the United Kingdom during the week ended the 16th November, 1872, and during the corresponding week of 1871. Week ended November 16th, 1872, total number of messages, 306,951; week ended November 18th, 1871, total number messages, 259,238; increase in the week of 1872 on that of 1871, 47,713.

THE report of the directors of the West India and Panama Telegraph Co. states that the receipts for the year, almost entirely derived from the eastern section of the line to Demarara, amounted to £27,950, and the expenses, including interest, to £19,471—leaving a balance of £8,479. Legal proceedings, however, are still pending between the company and the contractors for the cable.

ADVICES from Jamaica to the 23d November, state that communication between that place and Aspinwall by cable, has been interrupted. The break has been located at a point 160 miles from Aspinwall and the place has been carefully marked. An attempt to raise the cable, in order to make the necessary repairs, proved unsuccessful, and the company is now awaiting the arrival of new and improved grappling gear from England.

A PROPOSITION is mooted to connect Macao and Hong Kong, China, by telegraph.

ACCORDING to the *Patria*, of Lima, of the 22d of October last, Congress has authorized the Government to grant a subsidy of 20,000 soles for the extension of telegraphic communication from Payta to Panama, to form a union with the submarine cable just laid between Colon and Jamaica.

THE French are practicing, in the hilly country around Paris, the erection of military telegraphs. In the Buttes Chaumont Park, recently, where the cliffs and rocks are of the steepest, fifty soldiers of the engineer corps laid a perfect labyrinth of wires, and sent messages over all of them in half an hour.

THE Assembly of Victoria has been informed by the Chief Secretary that the Government will submit to Parliament before the end of the Session a proposal to subsidise the overland and cable telegraphic communication with India and Europe with the object of making a general reduction upon the cost of through messages.

THE STEARNS DUPLEX IN CANADA.

The Montreal Telegraph Company are introducing the Stearns Duplex quite extensively on their lines. A circuit of 250 miles, between Montreal and Toronto, and two other circuits, respectively between Montreal and Ottawa, and Ottawa and Toronto, have already been equipped with the apparatus; and another circuit will this week be opened between Montreal and Quebec. Instruments are now making for the Montreal and Sackville, N. B., circuit of about 800 miles, and others will be added as rapidly as possible. The instruments are from the well-known establishment of C. Williams, Jr. of Boston, and are of excellent workmnaship.

PRESENTATION TO MR. J. F. MORRISON.

Upon the recent marriage of Mr. J. Frank Morrison, Night Manager of the Western Union Telegraph office at Baltimore, Md., his associates in the office presented him and his bride, Miss Irene C. Sifford, of Frederick, Md., with a handsome silver tea set as a mark of their esteem and regard.

Mr. M. D. WOODFORD, who has lately resigned the position as chief of the telegraph department of the Michigan Central Railroad to accept that of Assistant General Superintendent of the Great Western Railway, was recently presented with a handsome bookcase, filled with choice books, valued altogether at about $600, by a number of the employees of the Michigan road.

C. L. LE BARON, for many years President of the Pensacola Telegraph Co., has gone into the commission and exchange business in Pensacola, Florida. Mr. Le Baron was one of the first in the South to join the Insurance Association, and has always evinced much interest in its prosperity. If success in his new business depended upon the good will of his telegraphic friends he would have nothing to complain of.

THE Union Pacific Railroad is to be congratulated in having secured the services of Mr. W. C. Langdon as train dispatcher at Laramie. Mr. Langdon has had considerable experience in regulating the movement of trains, he having been dispatcher at Burlington, on the C. B. and Q. R. R. With his professional qualifications he takes to his new position the reputation of being a gentleman of culture and courtesy.

BY an unaccountable error we announced in the Service Report of September, published in the JOURNAL of December 1st, the resignation of Mr. George W. Flagg, manager of the Newport, R. I., office. Mr. Flagg has not resigned nor does he intend to do so. Long may he wave.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is upwards of 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

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JOURNAL OF THE TELEGRAPH,
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NEW YORK, DECEMBER 16, 1872.

REPORT OF THE POSTMASTER-GENERAL.

The Postmaster-General's recent report to Congress contains an elaborate argument in favor of the governmental acquisition of the telegraphs, accompanied by statistics purporting to show the comparative cost of constructing, maintaining and operating telegraph lines in this country and in Europe.

In the Postmaster-General's report for 1871 he made a similar recommendation, accompanied by an argument in favor of the acquisition of the telegraph lines in this country, based upon the wonderful success of the post-office telegraphs in England, which, he asserted, yielded a net revenue of $3,391,954 for the fiscal year ending March 31, 1871—the first year of its operation. An examination of the official report made to the British Government showed, however, that the entire receipts of the telegraph department of Great Britain, from the commencement of governmental control on the 1st of February, 1870, to the 31st of March, 1871, a period of fourteen months, were only $3,865,127, and that the expenditures for the same period were $6,763,362, being an excess of expenditures over receipts of $2,898,235. This remarkable discrepancy was commented upon in Congress and in the public press, and yet, up to the present time, Mr. Creswell has neither made any acknowledgment of his error nor attempted to defend the correctness of his statement.

We do not suppose that Mr. Creswell made this gross misstatement intentionally, but that he either mistook the gross receipts for the net revenue, or was imposed upon by some one employed to supply him with information upon matters relating to the telegraph, but we cannot refrain from expressing our surprise at his failure to allude in any manner to this remarkable discrepancy in his present report.

We now propose to examine the statements and statistics relating to the Telegraph contained in the Postmaster-General's report for 1872, with the view of ascertaining whether they are any more reliable than those of the previous year. The report commences with a statement of Mr. Creswell's action in fixing the rates for official telegraphic despatches in compliance with the provisions of the Act of Congress, approved July 24, 1866, which rates, so far as they apply to Signal Service messages, he says, were objected to as too low by the Western Union Telegraph Company.

"The Western Union Telegraph Company," says the Postmaster-General, "contended, first, that the Signal Service messages, which, to be effective, require simultaneous transmission through special circuits, at certain times, were not covered by the Act of 1866, and could only be sent by special arrangement; second, that the understanding under which the company had been transmitting such reports was not intended to be continuous, but was terminable, at the pleasure of the company, at the end of a year from May 24, 1871, when the company gave notice that it would discontinue the service unless a higher rate should be allowed therefor. On both of these points I took the opposite ground, maintaining the right of the Government to require the transmission of the weather reports, under the Act of 1866, and also asserting the permanent character of the assent of the company to this construction of the law. In view, however, of the representations of the company as to the insufficiency of the compensation previously allowed, and acting on the recommendations of General Myer and Mr. Whiting, I advanced the rates for Signal Service messages from two to three cents per word for each circuit over which they might pass, in accordance with the plans of the Chief Signal Officer."

The company did not take the ground that the signal service messages, or any other class of Government messages, were exempt from the operation of the Act of 1866, but that the provisions of the Act conferred upon the Postmaster-General simply the authority to fix the rates, and not to dictate how the wires of the company should be worked, nor at what hours of the day or night the offices should be opened. Much effort has been made by interested parties to misrepresent this matter, but the question is a very simple one and can be easily comprehended.

Section 2 of the Act of July, 1866, reads as follows:

"And be it further enacted, that telegraphic communication between the several departments of the government of the United States and their officers and agents shall, in their transmission over the lines of any of said companies, have priority over all other business, and shall be sent at rates to be annually fixed by the Postmaster-General."

Under the assumed authority of the above act the Postmaster-General fixed the rates for the year commencing July 1, 1871, as follows:

The rate for all telegraphic communications, other than Signal Service messages and reports, was fixed at one cent per word for each circuit of 250 miles, or fraction thereof, through which it should be transmitted.

"The rate for Signal Service messages and reports at two cents for each word for each circuit over which it may pass, in accordance with the schedule of circuits and plans of the Chief Signal Officer of the Army, which are now adopted or may hereafter be adopted by him for transmitting these despatches, or such part thereof as he may designate, in such words or cyphers as may, from time to time, be directed by him. The amount thus estimated is to be taken in full payment for said despatches, no additional allowance to be made for drops, office messages, or other services or special facilities required by the Chief Signal Officer for the correct and prompt transmission of the said Signal Service messages and reports."

Now, is it possible that any unprejudiced person, can be found who will maintain that, under the authority granted to the Postmaster General in the above act, that officer was authorized to fix separate rates for different classes of government messages; or that, having fixed these different rates, he had the additional right to delegate to the Chief Signal Officer of the army the authority to arrange the circuit over which messages should be sent at the rates fixed by him? or that, having fixed the rate for signal service business at two cents a word per circuit, irrespective of length, he had the additional right to require that the company should transmit office messages, make drops, and perform all other services required by the Chief Signal Officer, free of charge?

It will not be contended, surely, that the authority to annually fix the rates gave the Postmaster-General the power to compel the company to send messages without any compensation, or to build lines when required by the Signal Office without reimbursement.

The truth is, that the compensation for the peculiar facilities afforded to the Signal Office was fixed by agreement between the Western Union Company and that department, and although it was deemed inadequate by the representatives of the company, it was accepted partly because of their desire to contribute to the success of a scheme, which, it was believed, would prove of benefit to the public, and partly because of representations on the part of the Signal Office that the appropriation would not justify greater compensation.

The Signal Service business was new and peculiar. It required the exclusive occupation of from twenty to thirty of the principal circuits, varying in length from 250 to 2,500 miles, three times in each twenty-four hours, and the dropping of the messages transmitted thereon at each signal station. In addition to the occupation of these important circuits, extending throughout the United States, for the transmission of the weather reports, the Chief Signal Officer represented that it was necessary that he should have at his disposal special circuits between Washington and New York, Washington and Chicago, and Washington and New Orleans. These circuits were required to be connected with the Signal Office at 7.45 A. M., 4.45 P. M. and 11.45 P. M., daily, and at such other times as the Signal Officer should call for them. The Signal Service had been in operation but a short time, however, when it was ascertained that these special circuits were being put to other uses than the correction of errors in reports and other matters connected with their transmission. It was found that they were being taken for purposes of display, as well as for the obtaining of trivial information, such as the hours for the departure of trains, the hiring of operators, the procurement of vaccine matter for the prevention of small pox, etc., etc., during the most crowded hours of the day, when they were most useful to the public, and, therefore, most valuable to the company.

The authority of the Postmaster-General to fix the telegraphic charges for government messages, under the Act of 1866, was not denied, but the company did not admit the right of that officer to control its wires, to direct when and how circuits should be made up, and to dictate the routes by which messages should be sent to their destination. Nor did it admit the right of any officer of the government to order its

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operators to open their offices at unusual and inconvenient hours in the morning, and to keep them open at night until the permission of some other government official to close them had been obtained. The position of the company upon this point was clearly and unmistakably set forth by the president of the company in the proceedings of the committee on Appropriations at Washington, March 29, 1872, in the following words which we quote from the report of that committee :

"I have conceded the right of the United States to require anything to be sent by telegraph, to anybody, anywhere within the reach of our wires, and at any time that our offices are accessible for that purpose. I distinctly disclaimed the position that there is anything about the messages of the signal-service that excludes them from the provisions of the act of 1866. The Chief Signal-Officer may file in the Western Union Telegraph Office any number of messages, directing them to be sent to as many stations as, in his judgment, it is necessary for the public service that they should reach ; and it is competent for the Postmaster-General to fix a rate to every station in the United States to be applied to that business ; but then and there his authority in the premises ceases. I take those messages and—exercising the utmost diligence, and being the best judge as to which wires I shall employ to do the work, and what is the most expeditous route between the initial and the terminal stations, or as to how many of several routes shall together be employed for that purpose—I must deliver these messages at their destinations. But that we shall keep an office open all night at some places and open half the night at other places, and shall open one at five o'clock in the morning, and another at six, and another at seven, in order that they may all be in telegraphic communication at the same instant, and that we shall connect the War Department or the Signal-Office with our main office, and permit its officers to control our wires, is a right which, with great respect to the Postmaster-General, I deny to have been conferred under this act."

The Postmaster-General was present when this matter was before the Committee and took part in the discussion. He was, therefore, not uninformed in respect to the position assumed by the Company.

Following the discussion of the Signal Service difficulty, the Postmaster-General presents an argument in favor of the monopoly of the telegraph by the government, and of its constitutional power to acquire and operate it, copied from the report of the Committee of Ways and Means, published in Vail's History of the Electro-Magnetic Telegraph, Washington, 1845, and adds, that "owing to the slowness of the public to recognize the advantages of the new invention, and the doubts cast upon the feasibility of its operation over long distances, the course recommended by the committee was not adopted, and the line built, and for some time maintained at government expense, was turned over to the holders of the patent."

The assumption that our government has afforded any material aid in the development of the Telegraph is incorrect. So far is this from being true, there is probably not an instance in the history of any country where the government has so persistently neglected or impeded an enterprise of such national importance. With the single exceptions of an appropriation of thirty thousand dollars, made by Congress in 1843, for an experimental trial of the Morse telegraph, which was entirely expended in the construction of the line beween Washington and Baltimore, and of a subsidy of $40,000 per year for ten years, granted to the constructors of a line from the Missouri river to the Pacific Ocean, over which all government business was entitled to priority and free transmission, the government of the United States has never paid a single dollar for the development of the telegraph. But, on the contrary, it has forced the telegraph companies to pay into the national treasury upon their gross receipts, within the past ten years, over one million five hundred thousand dollars, the greater proportion of which has been paid by the Western Union Telegraph Company.

"If the effects of rivalry between the telegraph and the mail upon the revenues of the Post Office have not been serious," says the Postmaster-General, "it is due alone to the liberal management of the latter as compared with that of the companies, a management which, since the invention of the telegraph, has reduced the rates of postage from twenty-five to three cents, and increased ten-fold the correspondence of the country. The natural policy of private companies is to extend facilities slowly and only to profitable points, to let their business augment gradually, and to reap large profits from a small number of messages, while a government system, managed in the interests of the people, pursues exactly the opposite course. Had the policy of the Post Office been adopted by the telegraph companies, or had the government held to the old rates of postage, the telegraph, instead of now transmitting one-fiftieth part of the annual correspondence of the country, would probably transmit at least one-tenth."

We think we can show that the Postmaster-General's conclusion is erroneous by referring to the practical operation of a telegraph system of the kind which he proposes, where the uniform rate is twenty-five cents instead of thirty-three, as he asks authority to make them. In the United Kingdom of Great Britain and Ireland, the number of letters delivered in 1870, according to the official report, was 831,914,000, and the number of telegrams sent by the Post Office Department was 10,084,020, being an average of one telegram to eighty-five letters, instead of one telegram to fifty letters, which Mr. Creswell says is the proportion in the United States. Now, if Mr. Creswell's theory is correct, and the British telegraph is all that he claims for it, there ought to be an annual transmission of 85,714,170 telegrams in that country, or eight and a half times more than they actually transmit.

The next argument brought forward by Mr. Creswell in favor of the governmental absorption of the telegraph, is based upon the improvements in telegraphy produced by the introduction of Stearns' Duplex Telegraph, and "the countless other applications of electricity to the transmission of intelligence yet to be made, which must, sooner or later, interfere most seriously with the transportation of letters by the slower means of the post."

Now, it seems to us, that, as the assumed object of the acquisition of the telegraphs by the government is the extension of facilities and the cheapening of rates, the government ought not to complain of the development of these facilities by private companies; and moreover, that while the government transmits letters at three cents each, the telegraph companies must make enormous strides on the road of progress before they can compete successfully with the post.

The next position assumed by the Postmaster-General is that the telegraph is defective and abuses exist which call loudly for reform ; that the system has grown up with, and by the side of railroads, and has naturally directed itself to profitable and easily accessible districts ; that the tariffs are exorbitant ; and that large districts are totally unprovided with telegraphic facilities.

These complaints are substantially the same as those made several years ago by Messrs. Gratz Brown, E. B. Washburne, C. C. Washburn, Gardiner G. Hubbard, and other advocates of governmental interference in telegraphy, which have been successfully answered and refuted again and again ; it being clearly shown that telegraphy was better and more satisfactorily performed in the United States than in any other country in the world.

Following the above mentioned stereotyped complaints, the Postmaster-General calls attention to a table containing telegraphic statistics partially furnished "by Mr. George Sauer, an American gentleman, residing in Europe, who has made the subject of government telegraphs a special study."

We have heard of this Mr. Sauer before. It was from him that Hon. E. B. Washburne obtained the statistics upon which he based his speech on the union of the telegraph and postal system delivered in the House of Representatives in 1868. It is to him that Mr. Hubbard, another advocate of postal telegraphy, acknowledges his indebtedness for European statistics, while Hon. C. C. Washburn, in his speech on the postal telegraph bill, delivered in the House of Representatives Dec. 22d, 1869, says "I have been greatly indebted to George Sauer, Esq., an American gentleman, residing in Paris, for many of my facts regarding European telegraphy."

As Mr. Sauer's statistics seem to have been the foundation, or tap root, of all the postal telegraph schemes which have been started in this country since 1868, and as the statements relating to telegraph matters of all the gentlemen who derived their information from Mr. Sauer had been almost invariably incorrect, pains were taken to obtain a copy of Mr. Sauer's compilation, for the purpose of instituting a comparison between his statistics and those contained in the official reports, and a review of Mr. Sauer's telegraph statistics was published as an appendix to the argument of Hon. William Orton President of the Western Union Telegraph Company, on the bill to establish postal telegraph lines, delivered before the select committee of the United States House of Representatives in 1870. This review, which was of the most complete and scathing character, showed that Mr. Sauer not only manufactured many of his pretended statistics, but misstated and garbled the official reports, and wholly perverted the facts respecting the cost of European telegraphy.

Referring to the comparative cost of transmitting

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telegrams in the United States and in Europe, the Postmaster-General says:

"The table shows that with a cost per mile for construction and equipment, much lower here than in Bavaria, France, Great Britain, Italy, and the average of Europe, and about equal to that in Belgium and North Germany, and with the yearly expense per mile of line which will compare most favorably with that of the countries mentioned, the telegraph in this country collects an average of seventy cents on each message, against an average of sixteen cents in Bavaria and Belgium, twenty-eight in France, twenty-nine in Great Britain, thirty-two in Italy, twenty-two in Germany, and thirty-eight in Europe generally."

Without stopping to discuss the first remarkable assertion in the above paragraph that the cost of constructing and equipping telegraph lines is much lower in the United States, with its high duties, inflated currency and costly labor, than in Bavaria, France and Great Britain, which seems scarcely worthy of serious consideration, we think we can show that the remainder of the statement is incorrect.

Upon examining the Postmaster-General's statistical table, which purports to give the general statistics of the telegraphs in Europe and the United States, we find many errors, the tendency of all of which is to increase the apparent rates in the United States and to diminish those of Europe. In the United States, according to Mr. Creswell's table, 13,700,000 telegrams were transmitted (including nearly 2,000,000 press messages), the receipts upon which were $9,590,000, which, it will be observed, makes the average charge precisely 70 cents. Now, amounts stated in round numbers are always liable to suspicion. If it were true that exactly 13,700,000 messages were sent, for $9,590,000, thus making the average rate precisely 70 cents, it would be a curious fact. It looks, however, as if there had been some estimating in the matter. Let us examine the facts, with a view of ascertaining whether this suspicion has any substantial foundation.

In October last the President of the Western Union Telegraph Company, at the request of the Postmaster-General, furnished a statement of the operation of the company during the fiscal year ending June 30, 1872, containing the following statistics:

MESSAGES.	
Number of paid messages sent during the year	10,271,935
Partially paid and free messages.....	660,303
Press Messages.....	1,512,361
Total number of messages.....	12,444,499
RECEIPTS.	
For transmission of messages.....	$7,040,803.53
For transmission of press reports.....	979,083.71
For transmission of market reports.....	107,579 72
For transmission of weather reports.....	137.522.88
From all other sources.....	192,105 93
Total receipts.....	$8,457,095.77

In the list of disbursements, also furnished to the Postmaster-General, were two items covering the amounts paid other lines, and refunded and uncollectible, amounting to $220,395.75, which amount is of course, properly deductible from the receipts, thus leaving the actual receipts for the transmission of messages, exclusive of press and weather reports, $6,820,407.78. No estimate nor account was made of the number of weather report messages transmitted. The number of press messages was stated in the letter to the Postmaster-General, as an estimate made by dividing the number of words sent for the press, by 30, which was taken as about the average number of words in ordinary commercial and social messages. The number of messages stated does not include messages sent by or for railroad companies between stations on the line of the roads nor service messages of the telegraph company.

Excluding from the account, both the estimated number of messages sent for the press and the receipts therefor, the account will stand thus: Number of messages sent, exclusive of press and weather reports, 10,932,138. Receipts for transmission of messages, $6,820,407, showing the average rate per message 62 cents, instead of 70 as stated in Mr. Creswell's report.

These statistics furnished by the President of the Western Union Telegraph Company, the Postmaster-General has not seen fit to publish, although he says that the figures given in his table, under the head of the United States, "are derived from estimates based upon data furnished by telegraph companies controlling over nine-tenths of the lines in the United States."

We have shown from the figures officially furnished to the Postmaster-General, that the receipts for the transmission by this company of 10,932,318 messages amounted to $6,820,407.78, and for the transmission of 1,512,361 estimated press messages, $979,083.71, making a total of 12,444,499 messages, and $7,799,491.49 in telegraph receipts.

Deducting the messages sent by the Western Union Company from the total number stated in Mr. Creswell's table as having been sent by all the companies in the United States, and deducting also the telegraph receipts of this company from the total telegraph receipts of all the lines, and this curious and most remarkable result follows: That the opposition lines sent during the year only 1,255,501 messages (of which nearly 500,000 were press messages), for which they received $1,790,508.51, being an average of $1.42 per message.

When it is considered that the opposition lines mainly extend over short routes where competition is popularly supposed to have greatly reduced the rates, we think the above exhibit is sufficient to show the incorrectness of the Postmaster-General's table.

On examining the table, containing his European and American statistics, we are struck with the different standpoints from which the statistics are exhibited. While in the United States a message is only counted once, whether it is transmitted one hundred or four thousand miles, it is counted in Europe over and over again, in each petty state through which it is transmitted. In this manner the apparent number of messages is greatly increased above the actual number sent.

While in the United States there is but one class of messages, there are in Europe three classes, called, respectively, internal, international, and transit. The internal messages are those which are transmitted, received and delivered in the same country. The international messages are those which are transmitted from one country into another. The transit messages are those which are neither sent nor received in the country in which they are reckoned, but are simply shot through it in going from one state to another. In this way small states like Bavaria, Belgium, Baden. etc., which really send but a small number of messages, are able to show an apparently large annual traffic. Countries so situated in Europe as a rule have adopted a low rate of charges for their internal messages, the deficit being made up by a tax upon international and transit messages paid by surrounding states. Thus, for example, Belgium charges a minimum rate of half a franc for the transmission, receipt and delivery of a message within her own territory, while she imposes double rates upon both international and transit messages, one class of which requires only one-half the service of an internal message—being simply either sent or received from or into the country—and the other class requiring no service at all, being simply sent through the air on its way from one neighboring state to another. The case would be analogous to that of one of our States which should set up an independent telegraph system of her own, and should charge a low rate for the transmission of messages within her own territory, and impose a heavy tax upon messages passing through her territory between the other States of the Union. Suppose the State of New Jersey, for example, was to establish an independent telegraph system, and fix the rates for messages passing within her own territory at the Belgian rate of ten cents, and then charge twenty cents for every message passing through her territory. The result would be very favorable to the finances of New Jersey, as the tax upon the correspondence between New York and Washington alone would more than pay the entire cost of her own system.

The Postmaster-General's table not only embraces paid internal and international messages sent and received, as well as the transit, but includes also the free messages sent and received. Thus, for example, in Bavaria the official report shows that there were transmitted in 1870, 295,170 internal and 197,018 international messages, making a total of 492,188. The receipts being $162,248, making the average rate about 33 cents. By including 219,992 received messages, 212,037 transit messages, and 85,929 free messages, the Postmaster-General's table swells the total number of messages to 1,010,176, thus reducing the average from 33 to 16 cents.

In Baden, according to the table, there were transmitted in 1870 629,291 messages, for $35,008, being an average of thirteen cents per message; while the actual number of messages sent in that country, exclusive of Government messages, was 337,443.

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In Italy, according to the Postmaster-General's table, there were transmitted, in 1870, 2,378,119 messages, upon which the tolls amounted to $945, 234, making an average rate per message, as stated in the table, of thirty-two cents; but which, when properly computed, give thirty-nine and eight-tenths cents per message.

In regard to the returns for Great Britain, a table is compiled, accompanied by foot notes, stating that "complete returns for previous years not having been received, the estimates of the British Post-Office for the year ending March 31st, 1873, are used instead." Also, that "the messages and receipts are classified by an average obtained by counting one weeks' business;" in other words, that regarding the only country in the world which possesses a telegraph and postal system combined, no reliable statistics are furnished notwithstanding the fact that the Government of Great Britain has been in possession of the telegraph for three years.

A careful examination of all the governmental telegraph reports for 1870 shows that the number of messages transmitted during the year was 36,732,460, the receipts upon which were $16,584,187, making the average receipt per message of 45 cents, while the expenditures were $22,445,976, showing an average expense for transmission per message of 61 cents instead of 38 cents, as stated in Mr. Creswell's report.

Leaving for the present the question of rates for the transmission of messages, let us consider the statements in regard to the cost of constructing telegraph lines in this country and abroad.

"The majority of lines in this country," says Mr. Creswell, "have been built very cheaply; their entire cost, including patents, being probably much less than $10,000,000. Data in possession of this Department show that many lines have been lately built, probably not of the best quality, but fully up to the average standard, for not more than $115 per mile of single wire line, and $30 per mile of additional wire. For equipment an allowance of $5 per mile is ample. Were all the wires to be strung at the same time, as they would be were the present system to be duplicated by the government, the cost would probably be much less. The cost of a new system, equal in extent to the present, would, at the above rates, be $11,880,000."

The extent of the system, which Mr. Creswell states could be reproduced at a cost of $11,880,000, embraces about 80,000 miles of line and 200,000 miles of wire.

The only estimate accompanying the Postmaster-General's Report, going to show the cost of constructing a similar system in the United States, is one furnished by Mr. Charles T. Chester, of this city. In this estimate Mr. Chester gives the cost of constructing 75,000 miles of line, and 175,000 miles of wire, including equipments, at $18,253,625; *provided the wire is imported free of duty.* This estimate, which, by the way, *is not footed in Mr. Creswell's report*, does not include cables for river crossings, of which the Western Union Company, alone, has in operation 234½ miles.

Mr. Chester has achieved some notoriety as the manufacturer of a certain style of telegraphic apparatus, but, we believe, has never had any experience in constructing telegraph lines, with the single exception of the fire alarm telegraph of the City of New York. This system is embraced in the following inventory, for which we are indebted to the President of the New York Fire Department:

INVENTORY OF LINES AND APPARATUS BELONGING TO THE NEW YORK FIRE DEPARTMENT.

625 Miles of wire.
2,650 Telegraph poles.
2,500 Feet of submarine cable.
549 Street boxes.
84 Gongs.
16 Dials.
41 Keys and bells.
1,189 Cells of battery.
1 Recording register.
2 Repeaters.
2 Switch boards.
1 Testing instrument.
1 Wheatstone's measuring instrument.
60 Galvanometers.
175 Lightning arresters.
61 Morse relays.
61 Morse keys.
2 Police dials.
9 Sets (Morse key, relay and bell).

For the construction and equipment of the above system Mr. Chester rendered a bill against the City of New York, as we are officially informed at the Comptroller's office, of $850,000.

Now if 625 miles of telegraph wire costs $850,000, then 175,000 miles would cost $238,000,000.

625 : 850,000 :: 175,000 : 238,000,000.

If, however, we suppose that the estimate which Mr. Chester has rendered to the Postmaster-General is a correct one, and that 175,000 miles of telegraph wire costs but $18,253,625, then 625 miles would cost only $65,187.

175,000 : 18,253,625 :: 625 : 65,187.

In Mr. Chester's estimate for constructing government lines, which he proposes to erect for $104.30 per mile of wire, he includes 75,000 miles of poles, averaging 33 per mile, and making a total of 2,475,000 poles. In the line which he constructed for the City of New York, for which he charged $1,360 per mile of wire, he used only 80 miles of poles, averaging 33 per mile, or a total of 2,650 poles.

For the government line the estimate embraces an average of 14 poles per mile of wire, and the average cost of the line per mile of poles is $243.38.

The line constructed for the City of New York, however, averages but a fraction over two poles per mile of wire, and the bill rendered for it is at the rate of $10,625 per mile of poles. On this basis the cost of constructing 75,000 miles of line would be $796,875,000.

We leave the Postmaster General and Mr. Chester to settle the discrepancy between the two estimates.

In Mr. Creswell's statistical table, he states the cost of constructing each mile of telegraph line in the United States at $120, and each mile of wire at $30; while he gives the cost of each mile of line in England at $164, and each mile of wire at $41.22. The greater portion of the telegraph wire used in the United States is made in England. The price of Johnson & Nephews' "extra best best" galvanized iron wire at Manchester is £26 sterling per ton, or 5¼ cents per pound. The cost of the same quality of wire delivered in New York is 10½ cents per pound, the duties, freight, exchange, premium on gold and other charges, nearly doubling the cost of English wire when laid down in this country. We think, therefore, that Mr. Creswell's statement that each mile of wire in England costs nearly fifty per cent. more than in the United States, needs some explanation.

The sizes of telegraph wire used in the United States are of 6, 7, 8, and 9 gauge, none being employed smaller than the latter, while in Europe much of the wire employed in the telegraphs is of No. 11 gauge, the latter size weighing but one-half as much as No. 8, and costing proportionately less. No. 6 wire, of which there is a considerable amount used in this country, weighs 550 pounds per mile and costs $57.75 per mile, delivered in the city of New York. No. 8 wire weighs, in round numbers, 400 pounds per mile, and, at 10½ cents per pound, costs $42 per mile. No. 9, the smallest wire used in this country for telegraph lines weighs 340 pounds per mile, and costs, at the place of importation, $35.70 per mile. Now, by what kind of calculation is Mr. Creswell able to show that wire costing from $35.70 to $57.75 per mile at the place of importation, can be transported all over this broad continent and erected along the lines of the railway and post roads at an average cost of $30 per mile, including insulators, cross-arms, and other appurtenances?

In the Postmaster-General's table the cost of the English lines and apparatus to date is stated at $9,037,320. The official report of Mr. Scudamore, however, shows that the British Government paid for them £7,500,000 sterling, or $36,450,000 in American gold currency, and that he had expended up to the 31st of March, 1871, $4,486,166.96 in construction of additional lines. How much he has expended since we are not informed; but Mr. Creswell does not accord to the British postal authorities a very marked aptitude for bargaining, when he states that their whole system has cost less than one quarter the amount they paid for it.

In a note at the bottom of Mr. Creswell's statistical table it is stated that the cost of the lines and apparatus of the English telegraph lines is estimated at the average of Continental lines. Upon referring, however, to the estimated cost of the Continental lines, in the same table, we find it stated at $170.72, while the average cost per mile in England is stated at $164.88.

Regarding the statement, that the majority of lines in this country have been built very cheaply, and that they are of an inferior character, we would say, that of the 62,000 miles of poles belonging to the Western Union Company, over 50,000 miles are cedar and chestnut, the best timber in the

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world for durability, and of the remainder 5,000 are of cypress and redwood. Of the 137,000 miles of wire in operation on the 1st of July last, 98,000 miles was galvanized. During the past six years the Western Union Company has expended $5,128,467.86 in the reconstruction and repairs of its lines, an amount which has fully maintained them in the best possible condition.

Referring to the rates charged by the Western Union Company, the Postmaster-General says :

"Incredible as it may appear, the official statements of the Western Union Telegraph Company show that their average receipt per message has been increased eleven cents, or nearly twenty per cent. since 1867, notwithstanding the undoubted reductions of tariff between important points."

On page 8 of the pamphlet issued by the Western Union Telegraph Company, on the proposed union of the telegraph and the postal systems, the following statement is made in relation to the traffic of 1867:

"The total receipts of the Western Union Telegraph Company for the above year were $6,658,925.36; but of this amount $521,509 were received for transmitting regular press reports on contract, and $308,788.40 from other sources, leaving only $5,738,627.96 for telegrams.

Of the 10,067,768 messages sent during the year, 8,004,770 were on commercial and social matters, and 2,062,998 containing special press news, the latter amounting to 75,359,670 words."

Now, dividing $5,738,627.96 by 8,004,770 messages would make the average rate 71 6-10 cents per message, against an average of 62 cents received during the past year, thus showing a reduction of over 9½ cents per message, instead of an increase of 11 cents, as stated by the Postmaster General. This statement, however, of the number of messages transmitted in 1867, was over-estimated. Up to that time no accurate record had been kept of the number of messages transmitted, and the statements published in relation thereto were, like those of the Postmaster General in his recent report, largely estimated. Since that date, however, accurate reports of the number of messages transmitted have been kept by the Company, and the result shows an average diminution in the rates for the transmission of messages of 23 8-10 per cent in 1869, 15 4-10 per cent in 1870; 16 2-10 per cent in 1871, and 16 8-10 per cent in 1872.

The Postmaster-General's report contains various ingeniously constructed tables, purporting to show the average rate of transmission upon the lines in this country and abroad, which serve to convey an erroneous impression of the average rates actually paid. We have not made a comparison between the pretended rates from Washington to the various stations named in the table, and the official rates, but assuming that they are correct, they by no means prove that the average charge is correct. If Washington, for example, sends the same number of messages to each of the thirty-two stations named on page 164, then the average charge per message would be ascertained by adding together the thirty-two separate rates and dividing the sum by the number of stations. For example, the charge from Washington to New York is 40 cents, and from Washington to Grenada, Miss., $2.70. The average of these charges is therefore $1.55, but it is probable that of every one hundred messages sent from Washington, ninety-nine will be sent to New York to one to Grenada. On this basis the average is forty-two cents instead of $1.55.

The Postmaster-General says that the experience of Switzerland and some other countries shows that a reduction of fifty per cent. in tariffs was followed by an increase of one hundred per cent. in business. Neither Switzerland nor any other country has made an average reduction of fifty per cent. upon its whole traffic, nor increased its business one hundred per cent. in any one year. The facts show that while some increase of business follows a reduction in the rates, the increase in the number of messages is much more nearly proportional to the increase of facilities. We cannot occupy the space in our present issue required for a careful and exhaustive illustration of all these points, but must leave that, together with many other interesting questions suggested by the Postmaster-General's report, for future consideration.

QUICK TELEGRAPHING.

The President's Message reached the telegraph office in Washington at twenty-five minutes past 1 o'clock. Within forty-five minutes, the shortest time ever attained with so long a document, it was transmitted to New York, Philadelphia, and Baltimore. Twelve wires were used, and the weather was favorable for working purposes. There were 11,339 words in the message. Within four hours after leaving Washington it was published in full in the evening papers and sold about the streets in this city.

SUBMARINE CABLES.

Cable property, after a long period of neglect, has at length come into marked favor with investors as well as with speculators. The successful reparation of the Australian cable has been the prominent cause of this—not merely on account of its being another proof that cable property is not any more precarious than any other, but because of the substantial increase it has given to the receipts of the Eastern companies, and most of all to the British Indian Extension, which line is said to be now earning 20 per cent. dividend. We long ago predicted that this line must be another Anglo-Mediterranean from the similarity of its position, and we expect that when the amalgamation of the lines beyond India takes place, the extension will, like the Anglo-Mediterranean, be taken in at double the amount of the others. We foresee no end of work for the Construction Company in the duplication of cables as traffic increases. In the case of the British Indian Extension, the extra traffic from the opening of the Australian line would alone pay for a cable, assuming the money to be raised at 7 or 8 per cent.—*The Railway News.*

NEW ELECTRICAL BATTERY.

M. Lionel Weber has invented a new battery, composed of a porous diaphragm filled with plumbago. This vessel is placed in a glass or porcelain vase containing a saturated solution of ammoniacal chlorhydrate. Into the plumbago is introduced a plate of charcoal which constitutes the positive pole; and into the solution which surrounds the diaphragm is plunged a plate of amalgamated zinc, forming the negative pole. This battery has been found to have great force, to be constant in the support of regular and continued work, to be economical, and to need but little attention.

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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 3. NEW YORK, JANUARY 1, 1873. WHOLE NO. 124.

LIGHTNING ARRESTERS.

Ærial telegraph wires are electrified by induction during thunderstorms, and become charged by currents of variable intensity and directions. When this accidental electrization is not too strong, the safety of the employes is not endangered, nor the apparatus exposed to any deteriation, the effects being limited to simple perturbations, which somewhat obstruct the passage of the voltaic currents and interfere with the transmission of messages. When the electric force developed on the line by a thunderstorm becomes considerable, however, the wires are traversed by currents sufficiently intense to throw the telegraphic apparatus out of service, sometimes the wires of the electro-magnets being fused by the passage of these accidental currents, and the iron bars of the electro-magnets become so strongly charged with permanent magnetism as to be rendered unfit for service. Still more serious accidents sometimes occur within the offices, where heavy discharges take place, which melt the connecting wires as well as those of the electro-magnets, and render the apparatus unfit for further use.

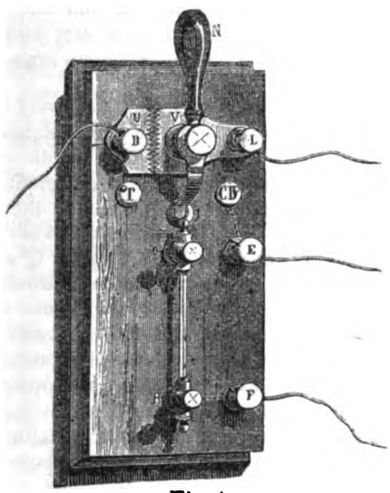


Fig. 1.

Various means have been proposed to preserve the apparatus from the reach of these accidental currents. On some lines abroad, the poles of the line are provided with tapering metallic rods, whose lower ends run into the ground, and which also serve the important purpose of carrying off the mixture of currents caused by imperfect insulation during rainy weather. These metallic rods, however, although efficient in protecting the poles, being isolated from the conducting wires do not shelter them from lightning nor preserve the stations from damage, occasioned by the passage of very intense currents.

The tension of voltaic electricity, employed in working telegraph circuits, is so small, that the current can only pass between conductors actually in contact, while that of atmospheric electricity, on the contrary, is so great as to enable it to pass across a considerable space of intervening air. Advantage has been taken of this principle to construct lightning arresters, or dischargers, to prevent injury to the apparatus during thunder-storms.

Figure 1 is an illustration of a simple lightning arrester, constructed by Mr. Breguet, which is very effective in insuring the safety of the instruments during the most violent thunder-storms.

Two metallic plates, U V, separated by a very small interval, and armed with points on their edges in juxta-position, are fixed on a small wooden board. The line wire terminates at knob L of plate V; the plate U has a knob B, whereon the ground-wire is fixed, and communicates with the button T. The plate V carries a commutator N, of which the metallic spring can at will be brought on one of the three buttons, T I C-D, which communicate the first with the ground by knob B, the second with ferrule G, the third with the knob E. Both ferrules G H are connected by a very fine iron wire, whose extremities are fixed on two small copper cylinders, kept back themselves by two strong screws. This iron wire is protected against accidental causes of rupture by putting it in the axis of a glass tube, or very dry wood covered with an isolating polish. Finally the ferrule H communicates with knob F, whereon is attached a metallic wire, that proceeds to the telegraphic apparatus of the station.

When the commutator N is on the button I, the line communicates with the apparatus of the station by plate V, the commutator N, the button I, the ferrule G; the iron wire, the ferrule H, the knob F, and its metallic wire. It is evident that the points of the plates V U can in no case convey the voltaic currents, used for the transmission of messages; these currents never having tension enough to cause a discharge at a distance. But during a thunderstorm, if the electric tension of the wire is very strong, a discharge will take place between plate V and plate U through the points in juxta-position, and the electricity accumulated by induction goes to earth without traversing the telegraphic apparatus of the office.

When the electricity accumulated by induction has not sufficient tension to be discharged from plate V to plate U, it flows away in the form of a current across the iron wire inserted between the ferrules G and H. If this accidental current has intensity enough to be dangerous, the iron wire, on account of its great resistance, is melted, and all communication is interrupted between the line and the telegraphic apparatus before the electric flow has obtained sufficient strength to injure them. When the iron wire is melted it must be quickly replaced, in order to re-establish the communication between the line and the telegraphic apparatus.

When a violent thunder-storm is to be feared, it is prudent to suspend all correspondence, which, moreover, is nearly always impossible under those conditions. Then the commutator N is pushed on the button T; the line is placed in communication with the ground through the plate V the commutator N the button T the plate U and the knob B, on which the ground wire is fastened, and the electricity accumulated by induction proceeds directly to the ground. The intermediate offices are provided with two lightning arresters symmetrically fixed on the same support. These two apparatus communicate in a permanent manner by a metallic wire fixed to knob E. When it is desired to establish direct communication without the current of the line passing through the apparatus of the intermediate office, the commutators N of the two lightning arresters are pushed on the buttons marked C D.

Starting from the same principles as Mr. Breguet, some constructors have proposed lightning arresters, which do not differ from the preceding one except by some modifications in the arrangement of the pieces. We will give a description of two of the models used on the French lines.

On the lower part of a wooden board (figure 2) are fixed three metallic limits, L T F. To the first is fastened the line wire, to the second the ground wire

X Z Y

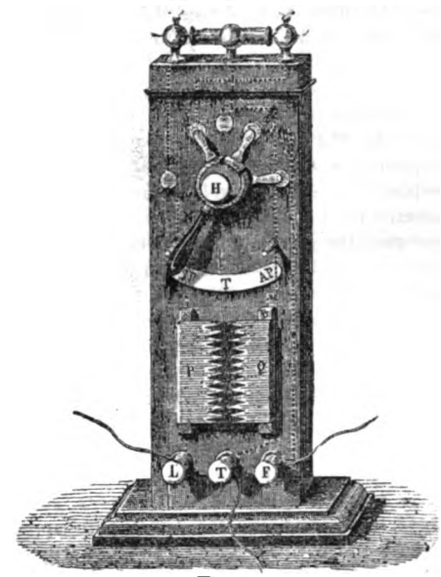


Fig. 2.

—to the third a wire, connecting with the telegraphic apparatuses. At the upper end of the wooden board are fixed two limits X Y kept in permanent communication by a very fine iron wire, surrounded by a silken envelope. This wire crosses the metallic cylinder Z, from which it is isolated by the silk. P Q are two metallic plates very near to each other, and toothletted on their edges in juxta-position.

The wooden board has besides four more buttons, *a b c d* and a commutator N with three metallic springs. The median spring only communicates with the metallic axis H of the commutator, the two lateral springs communicate with each other, and are isolated from the median spring, as well as from the metallic axis H.

Metallic bands fixed to the posterior face of the support and indicated on the engraving by dotted lines, establish the communications between the different pieces of the apparatus.

The binding screw L receives the wire and com-

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municates in a permanent manner with plate P, the metallic axis H and the median spring of the commutator N. The binding screw T receives the ground wire and communicates permanently with plate Q, the button *e* and the metallic cylinder Z.

Binding screw F receives the wire of the telegraphic apparatus belonging to the station, and communicates permanently with the button *d*.

Binding screw X communicates with the button *a* and the limit Y with the button *c*, these two limits are connected by the isolated iron wire lodged in cylinder Z.

A metallic arc fixed beneath the commutator serves to determine the position, which ought to be given to the handle N, according to circumstances.

When the weather is not stormy, the handle N of the commutator must be pushed on the letters S P, then the median spring rests on the button *d*. In this case, the communication is directly established between the line and the telegraphic apparatus and the current does not traverse the iron wire lodged in the cylinder Z.

When a thunderstorm threatens, the handle N of the commutator is to be pushed on the letters A P; in this case the median spring rests at the button *b* and the lateral springs rests one on *a* and another on *d*, which they bring in communication. The telegraphic apparatus communicates still with the line, and correspondence can continue. In fact, the current of the line communicates with the button *b* by the median spring of the commutator, passes to the limit Y, traverses the iron wire, proceeds to the limit X, the button *a* and the button *d*, across the latteral springs of the commutator, and thence proceeds to the binding screw F, and to the telegraphic apparatus. But by this arrangement the apparatus is preserved from the disastrous consequences of the too intense currents which the atmospheric electricity develops in the line. When the electric tension is very powerful, a spark flashes out between the points of the metallic plates P Q, and the electricity goes to earth by the binding screw T without traversing the telegraphic apparatus. If the discharge is not effected between the plates P Q, the currents which are developed on the line being too intense, the iron wire inserted between the limits X Y, is either melted or has its isolating envelope burned up. In either case the communication is established by the inter medium of the iron wire, denuded or melted, between the limit Y, the cylinder Z, and the limit T, the currents going directly to the ground, and the telegraphic apparatus is preserved, but correspondence necessarily is interrupted until the iron wire inserted between the binding screws Y X is replaced.

If the thunderstorm is violent, any correspondence is impossible. Then the telegraphic apparatus ought to be completely isolated by pushing the handle N of the commutator on the letter T. The median spring of the commutator touches the button *c*; all the currents of the line immediately pass to the ground, across the plates G, and the binding screw T, the telegraphic apparatus is completely isolated from the line, and sheltered from any harm.

Figure 3 represents a third lightning arrester, built on the same principles.

The apparatus is entirely fixed on a vertical wooden board. The chief piece of this apparatus is a rod *i i'*, composed of three metallic cylinders *g f e*, isolated from each other by means of two ivory thimbles *h h'*. The intermediate cylinder *f* is enlarged in its medium part, and sunk in a channel at both its extremities. A very fine iron wire covered with silk is fixed to the upper extremity of the cylinder *e*, by means of a screw-knob *i*, and is coiled up on the cylinder *e*, lodging in the screw channels at the upper part of the cylinder *f*,—rolled up on its enlarged part, engaged in the channels of its lower part, rolled up on the cylinder *g*, and fixed to its lower part by means of the screwknob *i'*.

As long as the silken envelope is preserved the two extreme cylinders *e g* communicate by the iron wire, and remain isolated by the medium cylinder *f*. But, when the isolating envelope is destroyed, communication is established between the upper cylinder *e*, and the medium cylinder *f*.

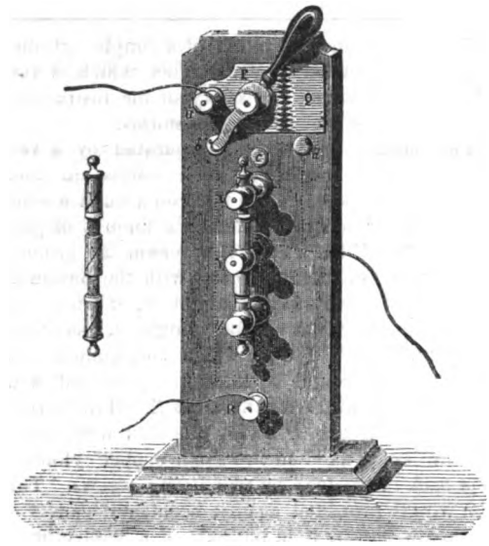


Fig. 3.

At the upper part of the wooden board are fixed two metallic plates P Q, very near to each other, armed with teeth on their edges in juxta-position.

Plate P has a knob *a*, on which the wire L is to be fastened, and a commutator with springs N. Underneath these plates are three buttons *b c d*. At the lower part of the wooden board is to be found a binding screw B to which a metallic wire F is fastened, which proceeds to the telegraphic apparatuses of the post.

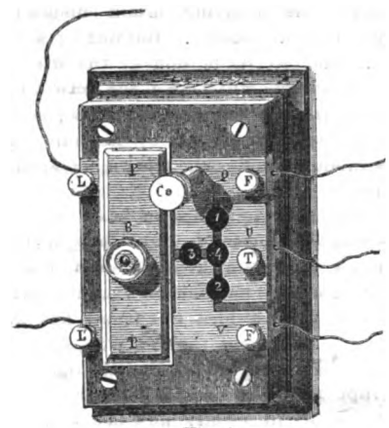


Fig. 4.

Finally the wooden board contains three large copper ferrules X Y Z. The median ferrule Y is armed with a hollow copper cylinder. The rod *i i'*, of which we have given the description, enters into these three ferrules, and in the copper cylinder of the median ferrule. Three screws serve to establish the communication of the three ferrules X Y Z with the three cylinders superposed *e f g* of the rod *i i'*.

The upper ferrule X communicates with the button *c*.

The lower ferrule Z communicates with the button *b*, with the binding screw B, and by the intermedium of this limit with the telegraphic apparatus of the post.

The ground-wire T is to be fastened behind the wooden-board, at the middle ferrule Y, which communicates besides with the button *d*, and the metallic plate G.

In ordinary weather, the spring of the commutator N is kept down on the button *c*. The line is then in communication with the telegraphic apparatuses of the office through the intermedium of the lightning arrester and iron wire. Moreover, as long as the iron wire and its envelope are untouched, the ferrule Y and the median cylinder *f* of the rod *i i'* are isolated from the remainder of the apparatus, and correspondences can continue. But, if the currents caused by the storm acquire too much intensity, the iron wire becomes melted, or at the least its isolating envelope is burnt up, in this case the upper cylinder *e* of the rod *i i'* and the ferrule X are put in communication with the median ferrule Y, the transmitted currents go to the ground through the wire T, the telegraphic apparatuses are isolated from the line, and preserved from the disastrous effects of the atmospheric currents. When the electric tension of the line is considerable, a discharge takes place between the points of the plates P Q, and the electricity goes to the ground by the wire T.

When there is a violent thunderstorm all correspondence must be abandoned, and the metallic spring of the commutator pushed on the button *d*. In this case the line currents go to the ground, and the telegraphic apparatuses do not communicate with the line, and are sheltered from any harm.

The iron wire, rolled up and around the rod *i i'* ought to be looked after with great care, and must be replaced whenever its isolating envelope is injured.

Figure 4 represents a very plain and very ingenious lightning arrester, used on the Belgian telegraphic lines. We will indicate here the disposition adopted for an intermediate office, communicating with two corresponding stations, one at the right, the other at the left. On a wooden socket are fixed three metallic plates, Q U V. At plate Q and at L the wire of one of the corresponding stations, and at F the wire of communication with one of the telegraphic apparatuses of the office. At the plate V and at L' the wire of the other corresponding stations, and at F the wire connecting the other telegraphic apparatus of the office. The ground-wire is fixed at T to plate U. A fourth metallic plate P P covers over the appendages of the plates Q V, and is isolated from it by a *very thin sheet of paper*. This plate P P is fixed by a metallic knob B which communicates with the plate U, and by its intermediary, with the ground-wire. The wooden board is perforated with four circular holes 1 2 3 4 bordered with the plates Q U V. C is a movable brass plug, which at pleasure can be put in one of these four holes.

When the plug C occupies the position indicated on the diagram, the wires L L' are directly in communication with the telegraphic apparatus of the office, and correspondence can be kept up. When a thunderstorm suddenly bursts out on one of the lines the electric tension becomes considerable, a spark flashes out across the paper put under plate P,—all the currents transmitted on this line go to the ground by the plate U and the ground-wire, the apparatus of the office being safe.

When a violent thunderstorm is threatening on the line L the plug C is to be placed in hole 2. The plate V communicates with plate U, all the currents of the line L' immediately proceed to the ground, the corresponding telegraphic apparatus are safe, and correspondence can continue on the line L.

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When the storm at the same time threatens the two lines L L', the plug C is to be put in the hole 4. Then the two plates Q V communicate with U, the currents transmitted on the two lines immediately go to the ground, the apparatus are safe, but correspondence is suppressed on the two lines.

To establish direct communication between line L and line L' the plug C is to be put in hole 3. It is evident that in this case all the currents transmitted on the line L directly pass on the line L', without crossing the apparatuses of the office and reciprocally.

Mr. Bianchi proposes the following simple plan: A large metallic sphere is put in the circuit of the line. This sphere is enveloped by two glass hemispheres in a metallic circular band, itself being armed with a large metallic rod, which is to be screwed on a metallic plate, fixed against a wall. This metallic rod is hollow and shut off by a faucet, and communicates with the interior of the enveloping glass sphere. A metallic band establishes the communication of the metallic plate with the ground. At its inner face, the metallic band is armed with a great number of metallic points all directed towards the centre of the sphere and very near to its surface by their free extremities. Before fixing the apparatus on the plate, it is proper to make the vacuum in the surrounding glass sphere, but this precaution is not indispensible.

When the line is violently influenced by stormy clouds, luminous points are to be seen at the extremities of the points, wherewith the band is armed, the ground furnishes across the conductor, the plate, the band and its points, a continued flow of electricity, which neutralizes the charge of the contrary denomination on the line. When the line is too strongly electrified, sparks flash between the sphere and the points of the band, and the charge accumulated by induction on the wire flows into the ground. In both cases, the currents caused by the influence of stormy clouds cannot penetrate into the station, and the telegraphic apparatuses are kept safe from all harm.

A REMARKABLE EXPERIMENT WITH ELECTRICITY.

The body of John Barclay, who was executed at Columbus, Ohio, on November 3rd, was made the object of an experiment with a powerful electric battery, for the purpose of trying the effect of electricity as a means of restoring life. The experiment is thus described :—

Thirty-seven minutes after death the students began operations. The electrical instrument used was one of the most powerful, consisting of six cups of Bunsen's battery, attached to Ritch's induction-coil of the largest size. It was operated by Prof. Mendenhall, of Columbus, an eminent electrician, while Prof. Wormly and Profs. Holderman and Denig conducted the experiment. Two currents of electricity were used, one placed at the lower extremity of the body, and the other drawn along the arm, neck, face, and breast. The effect was wonderful; the eyes opened, the face drew up as if in pain, the mouth jerked to one side, the arm raised as if to strike, and the fist clinched. The limbs also raised, and the toes and fingers worked, and once the body almost turned to one side. The arms were next laid bare and a current of electricity introduced. The whole system seemed to respond, and the movements of the body were at times violent.

At four minutes to two o'clock the electricity was removed, and faint actions of the muscles could even then be observed. The body was afterwards left until ten minutes after three, when the electricity was again applied, and the muscles of the body still responded as before, but with less force. The breast was then opened, and a current passed into the heart, but gave no response. It was carried to the hands and feet, and all responded as before. The heart was then taken out and found as hard as muscle and full of blood, the lungs not congested, the brain very healthy and free from any congestion whatever. At eleven minutes after four o'clock electricity was again applied, and a good response was had ; at eighteen minutes after five a faint response was given ; and at fifteen minutes to six, five hours and thirty-five minutes after death, the strongest experiment that could be applied, failed to move a muscle.

CONDUCTING POWER OF DIFFERENT METALS.

Priestly, in his History of Electricity, published in 1767, gives the following interesting account of an experiment suggested by Dr. Franklin for ascertaining the conducting powers of different metals.

"In a conversation I once had with Dr. Franklin, I asked whether it was probable that there was any difference in the conducting power of different metals, and if there was, whether it was possible to ascertain that difference. Dr. Franklin suggested that I try the conducting power of different metals, by sending a large shock through wires of the same size and observing the different lengths that may be melted of the different wires. I subsequently endeavored to carry the scheme into execution by transmitting the same explosion of the battery through two wires at a time of two different metals of the same thickness. They were hooked one to the other and held fast in hand vises after they were measured with a pair of compasses to exactly the same length. The experiments were much more pleasing and satisfactory than I expected, but the result by no means corresponded to my ideas, *a priori*.

"I first joined a piece of iron wire and a piece of copper wire. The explosion totally dispersed the iron and left the copper untouched. The brass likewise disappeared when joined with the copper and the iron when joined with the brass. So far the experiments were extremely easy ; a single charge of the battery sufficing to determine the difference between any two, but when I came to compare the more perfect metals, I found much more difficulty and was obliged to try four or five charges of the battery upon every two, for their conducting powers being nearly the same, I either made the charge too high and dispersed them both, or too low and touched neither of them. At length I happened to hit upon such charges that the copper vanished and left both the silver and gold, and the gold remained when the silver was dispersed. The hook, however, of the silver was melted off when the copper was dispersed, and the hook of the gold when the silver was dispersed, for the heat is always the greatest where the electric fire passes from one body to the other. Before the dispersion both of the copper and the silver I had made explosions of such a strength as though too small to melt them, gave them a bluish tinge. From these experiments it is easy to settle the order in which the metals above mentioned are to be ranked, with respect to the power of electricity to melt them. It is as follows: iron, brass, copper, silver, gold.

"Not being able to get lead or tin drawn into wires I got pieces of those metals rolled into plates equally thin, and, taking small slips of equal length and breadth, I transmitted the explosion through them, when the lead gave way the first. I intended to have compared these plates with others of iron brass, &c., but had not an opportunity. I have little doubt that tin would melt before iron, though indeed I had expected that tin would have melted before lead, and gold before silver. But according to Mr. Wilke's experiments, lead is a worse conductor than any of the other metals. My own experiments on the circular stops made me expect that gold would have melted before silver.

"It is very remarkable that when iron wire is melted by the electric explosion, bright sparks are generally dispersed about the room in all directions ; but that they are seldom or never seen when wire of any other metal is used. If but a small residuum of a battery be taken between two iron rods when the explosion is extremely little, a great number of small sparks will fly in all directions from the iron to the distance of about an inch, and exhibit a beautiful appearance. Fewer of these sparks will be seen if one of the rods be brass, and, I think, none, in these small discharges, if they both be brass."

FORETELLING MAGNETIC AURORAS BY TERRESTRIAL ELECTRIC CURRENTS.

Magnetic auroras being periodic phenomena which appear to have an intimate connection with the movements of the solar atmosphere and with the activity of terrestrial magnetism, we may ask if it is not possible, by the observation of solar spots and protuberances and of the terrestrial currents that traverse telegraph wires, to predict the appearance of auroras, as by the descent of a barometer and perturbations of the magnetic needle the approach of squalls and cyclones is foretold.

At Palermo the advance of such a magnetic storm has been predicted by an observation of the changes the sun presented during the day. But such observations made by a skilled astronomer trained to the use of the spectroscope are exceedingly delicate, and in the present state of the science are not perfectly reliable. Not so, however, with the currents in telegraphic wires which nearly always precede magnetic storms. These might, without difficulty, be employed for the purpose in view.—*Nature and Science, in Scribner's for December.*

TELEGRAPHIC EXPERIMENT.

In a communication to the *Chemical News*, Mr. H. Highton gives the result of an interesting experiment made with his new instrument upon a broken cable. It is as follows :

"On November 4th the cable from Dover to Boulogne was broken by a ship's anchor, about five miles from Dover. By the kind permission and co-operation of Mr Bourdeaux, the engineer of the Submarine Telegraph Company, I placed my instrument (as shown lately before the Society of Arts, and described at the time in your journal) between the end of the broken cable at Dover and the water-pipes of the town. To our surprise we could distinctly read every message to and from Ostend, Calais, and Dover, on the Dover-Ostend, and Dover and Calais cables. The explanation was as follows : Part of the electrical current which went to earth at the Dover water-pipes went on to a second earth formed by the end of the broken cable, and in its passage made signals on the instrument. Thus the enormous fault formed by the Dover water pipes was not sufficient to prevent a perceptible current of electricity passing on to the broken end of the Dover and Boulogne cable.

We also asked the French operator at Boulogne to send a current through the broken cable, and got a feeble result ; but as we were not able, without special authorization from the French Government, to get him to put on such batteries and instruments at Boulogne as were necessary, and the remaining cables were fully occupied with messages, we did not follow out this portion of the experiment. The first experiment, however, shows what an enormous fault may exist without preventing the action of the delicate instrument, which I described in a former number of your journal.

I am, &c.,

H. Highton.

Putney, November 12th, 1872.

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CORRESPONDENCE.

QUINCY, ILL., Dec. 4th, 1872.

To the Editor of the Journal of the Telegraph:

As you invite practical suggestions relating to economy and reform, I submit a few.

The new operating tables, with glass partition, and gas jet in the centre, used by the W. U. Company, in their large offices, are handsome in appearance, but objectionable in other respects.

The gas light being in front of the operator throws its glare, as well as the reflection from the polished table, directly into the operator's eyes, so that in some positions it is almost impossible to see the sheet upon which he may be writing. This is especially bad for those who write on the glazed manifold paper, on which "press report" is usually copied. The eyesight of the operator will inevitably be impaired sooner or latter by this manner of abusing it. The difficulty might, perhaps, be obviated by attaching a drop leaf to one end of the table, so arranged that the operator could sit with the light at his back or at one side.

The peg switch boards used by the same company are perhaps the cause of a great many "bad connections." I know of a switch board of twenty wires capacity, which has been in use about nine months, and when I saw it last, it had scarcely a nut or post on its back but what was loose, many of them would open the circuits running through them at every sudden jar on the floor. This board had been placed in position by one of the company's electricians, and was undoubtedly in good order when first put up. Changes of temperature undoubtedly affect these switches, hence the necessity of frequent attention, especially at the beginning of Summer and Winter.

J. J.

BURLINGTON, IOWA, Nov. 23rd, 1872.

To the Editor of the Journal of the Telegraph:

Please allow me to offer a few suggestions in relation to checking and counting paid business. First—Instead of "City" and "Through," why should a prefix consisting of one letter, not do as well? Say "C" for the former, and "X" for the latter.

Second—Would it not be an improvement to give the number of words in a message immediately after the prefix instead of after the signature? This would inform the receiving operator how long a message he had to "get down" on the "blank," and also to enable him to check the number of words as he wrote them. If the message was a lengthy one, he could put so many words in each line, as the lines could be easily and rapidly counted.

In England, the Telegraph Companies use what is called "Code Time," which is entered on the face of the "Sending" blank by the Receiving or Counter clerk. The operator is ruled entirely by this code time in sending messages, priority being his guide, and there is no deviation from this rule. Any operator who is guilty of sending a message out of its proper "turn," is severely dealt with. In addition to this, the code time is valuable to the receiving office, as it shows exactly at what hour and minute the message was handed in at the sending office. Sometimes this information is of great benefit and importance to the receiver of a message. I inclose an imperfect sketch of this "code," showing letters for different hours and minutes. It is very simple, costs nothing, and might be of some advantage to the service.

B.

To the Editor of the Journal of the Telegraph:

Permit me in your columns to say a few words about the feminine members of the profession, their peculiar disadvantages and disabilities, hoping thereby to secure even a larger share of leniency and a still firmer grasp of the brotherly helping hand, which, as far as the writer can testify, has always been kindly and freely tendered.

To excel in the art of telegraphing requires speaking phrenologically—memory, continuity, individuality, language—largely developed, with accuracy and firmness, quickness and self-poise, the last being one of the most necessary qualifications, for the faculties should be under perfect command, kept in the hand as it were, ready to do service when needed, with unfailing certainty.

Consequently the operators, as a class, are slender, nervous, quick, bright-eyed, and sharp-featured. The ponderous, slow but sure mover and thinker, although one of the weights wherewith the world is balanced would be in a telegraph office like an "elephant in a China shop"—the saying is an old one, but I never heard that elephants had any predilictions for the China business, neither do the abovementioned type of men usually care to bring their huge propelling powers to the delicate perceptive management of the mysterious little electrical key.

On the contrary, woman being man repeated in a weaker but finer and more sensitive mould, when her supernervousness is well controlled, ought to be peculiarly adapted to this profession; but is her success above mediocrity? I think not. "She does very well, indeed; surprisingly well for a lady" is a remark too often heard, and all the more hurtful, because perhaps, in the aggregate, deserved. The reason why upon entering the arena of business life, she so often fails to reach excellence, is not inherent incapacity, but bad mental training. No one who has had that wide-awake, wit-sharpening, lookout for number one educating process which our American boy necessarily passes through in his gradual develvelopment to manhood, can have any idea of the disadvantage with which a young girl, her whole previous experience carefully shielded from responsibility, when compelled to do so by a reverse of fortune, takes her place in the ranks of busy workers and begins the hand to hand battle for dollars and cents. And here is the key to all the trouble; it is seldom, except when driven to it by misfortune, a girl of culture does or expects to work for her living, and this is why she is so poorly prepared for the emergency when it comes; but her task is easy compared with the untold obstacles in the way of a woman of mature years when placed in the same position; unaccustomed since school days to mental exertion unless in the mood, and to many the mood never comes, having accomplished the daily duties of life, because never paid for her labor, in a hit or or miss manner, "if it turns out right well, if not nobodies business," enervated from poor inertia, old and worn out for want of healthy, regular employment, and the sense of usefulness which is the life of living; she comes to her work, weak and flaccid, mentally and physically, unable to meet the required duties, and there is nothing left but to patiently and laboriously begin again and build herself up anew.

This is the present condition of a number of women and girls preparing for and taking their places in Western Union offices. Many there are, I am proud to say, healthy and trained in body and mind; an honor to their sex and profession; these are amply to care for themselves. To the others, perhaps, a few hints may be of service from one who through her own imperfections feels the necessity for improvement.

In a future paper I may say something about training the mind to quickness and accuracy.

A.

Ought a forwarded message be pasted to a No. 2 blank?

Answer—If the message originated upon the Western Union lines it is not necessary to attach it to a No. 2 blank for re-transmission, but if it was received by some other line and handed into our office for transmission, it should be attached to a No. 2 blank, in accordance with the requirements of Rule 2.

Ought any remark after a DH check go over the wire, whether it be "opr," "pass," or on any other account?

Answer—No remark of any kind should be transmitted in explanation of the checks. The sending office is responsible to the company for all messages sent, and the receiving office is only required to know that a message is paid, collect, or free. It is, of course, unnecessary to add "it is an answer" to collect checks.

In attaching a red blank No. 45 to a No. 2 blank, to have it go at full rate, ought not the printed red instructions be torn off?

Answer—Yes.

Should not receiving clerks put checks on half-rate messages in the same way that they are to be sent over the wires?

Answer—The receiving clerk should, in all cases, state the number of words and amount paid or collectible upon all full or half rate messages, but the operator, in the transmission of red messages, will simply say paid, or collect, half rate.

A message is sent from a railroad office to an out side party, and asks for answer, the message was sent D.H., R.R.S.

Now, the answer comes back into Western Union Office, *collect*, and the railroad agent refuses to pay charges, saying it should be DH., R.R.S.

Should I make last message *uncollectible*, or instruct sending office to make it D.H. or what?

Answer.—Your only course is to return the message as uncollectible, with a full statement of the reasons. If the sending office had a right to send the message free in the first instances, the answer would properly come back free, but if the original message was not entitled to free transmission, the office from which it was sent would be responsible for the tolls.

W. T. S., Larned, Kan.—You are wrong; there are but sixty-two words in the message. The rule is that when amounts or numbers are duplicated in figures, the figures shall be counted as containing the same number of words as the amounts which they represent are written out, it making no difference whether the figures are written before or after the words which represent them. For instance, "twenty thousand (20,00)" when written out and duplicated in figures, are counted four words.

H. T. B.—We cannot inform you where a map of the telegraph lines of the United States and its territories can be obtained. It is doubtful whether such a map exists.

G. E. S.—The Journal of the Society of Telegraph Engineers, is published by that society at London. It is not issued regularly; but one number has as yet appeared, that dated May, 1872.

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FOREIGN TELEGRAPHIC ITEMS

THE TELEGRAPH IN BRAZIL.

By decree of 30th October, Art. 10th of the decree of August 16th last, authorizing Baron de Maua to lay a transatlantic cable, has been superceded by the following:

"At the end of the twenty years of exclusive privilege the concessionary will have the enjoyment of the cable or cables he may have laid, but without any privilege."

This removes the ambiguity which existed in the superceded clause.

The southern telegraphic line has been opened to Jauguarao, which is on the frontier with the Oriental republic. The lines of the Platino-Brazileira Company were commenced at Montevideo on 20th of October, so that much time will not elapse before the La Plata and Brazilian telegraphic systems will be connected.

At Bahia work was begun on the 7th of October on the telegraph to the north, to join the Pernambuco one in the provinces of Sergipe, at Aracaju. The distance is 396 kilometres.—*Anglo-Brazilian Times.*

The concession for laying and working the submarine telegraph between Odessa and Constantinople has been granted by the Russian Government to the Danish engineer, Herr Tietgen, whose project has been handed by the Minister of the Interior to the Supreme Council of the Empire for approval and confirmation.

The French Atlantic Telegraph Company have decided upon raising the balance of the money required for their new cable by the issue of £400,000 six per cent. debentures, redeemable within fifteen years at par, to be allotted *pro rata* to their shareholders at the price 95 per £100, the instalments to be spread over six months. Powers are taken to pay off the bonds at any time by giving three months' notice, in view of the arrangements for amalgamation.

It is stated that a company is now in the course of formation to lay a submarine telegraph from Rangoon to Singapore, touching at the Andaman Islands, Penang and Malacca. The tariff for messages from India to Singapore by the new line will be 24s., against the present rate of £2 14s. Arrangements have been made to carry "through" messages between London and Singapore for £3 10s. instead of £5 10s., and a corresponding reduction will take place in the tariff to China, Java and Australia.

The postal administration of the Imperial German Government is about to establish at Berlin a system of pneumatic tubes for the transmission of letters and parcels from the central to the district post-offices throughout the city, and to the railway stations. This is an extension of the system now in use for the transmission of telegraph despatches.

The Madrid *Gazette* publishes a decree approving the cession by Messrs. Aspinwall to the Anglo-Spanish Telegraph Company (limited) of the concession granted by the Spanish Government for the submarine cable between England and Irun.

A proposal by Clarke & Co. to construct a cable between Chili and Peru has been referred to the Chilian Congress.

A contract has been made with the Government of Guatemala for constructing telegraph lines so as to place the capital in communication with Salvador, the principal towns in the interior of Guatemala, and the two seaports of San Jose and Champerico.

The *Adelaide Observer* of July 20, 1872, gives the following details of the telegraphic route from Falmouth to Port Augusta:

	Miles.
Falmouth to Gibraltar, via Lisbon cable	1,250
Gibraltar to Malta (cable)	981
Malta to Alexandria (cable)	819
Alexandria to Suez (overland line)	224
Suez to Aden (cable)	1,308
Aden to Bombay	1,664
Bombay to Madras (overland)	600
Madras to Penang (cable)	1,213
Penang to Singapore (cable)	301
Singapore to Batavia (cable)	560
Batavia to Bangoewangi (wire)	480
Bangoewangi to Port Darwin (cable)	970
Port Darwin to Port Augusta (wire)	1,800
Port Augusta to Adelaide	21
Total	12,382
Lisbon to Falmouth	268
Total	12,650

Post Office Telegraphs.—Statement showing the total number of messages forwarded from Postal Telegraph Stations in the United Kingdom during the week ending the 23d of November, 1872, and during the corresponding week of 1871: Week ending November 23d, 1872, total number of messages, 302,664; week ending November 25th, 1871, total number of messages, 241,465; increase in the week of 1872 on that of 1871, 61,199.

Postal Telegraphs.—The official return, made in pursuance of the Act of Parliament, shows that the gross amount received in 1871 by the Telegraph Department was £1,133,575, from which must be deducted £401,210 for the amount paid to submarine telegraph companies, being message receipts collected on their behalf, and the amount allowed to postmasters in respect of sums paid by them for the special delivery of messages, &c. This reduces the year's receipts proper to £732,365. Sums amounting to £487,544 were expended in the year in respect of salaries, rent, maintenance of telegraphs, &c. This left a balance of £244,821 applicable to the payment of annuities of interest falling due upon the securities issued under the authority of the Telegraph Act of 1869, and as a sinking fund for the redemption of such securities.

At a general meeting of the China Submarine Telegraph Company (Limited), held recently, a question was put to the chairman as to the amalgamation of the British Indian Extension, China Submarine, and Australian Telegraph Companies. The Chairman, in reply, intimated that negotiations were in progress for the purpose of amalgamating these companies, the result of which will be the duplication and extension, where necessary, of the different lines comprising the system.

Now that the telegraph on the railway from Christiana to Stockholm is completed, there is a direct telegraphic communication between the two sister kingdoms of Sweden and Norway. The arrangement has been made that, of the three wires from Christiana to the Swedish frontier, one of them carries messages to Stockholm, the second to Gothenborg, and the third to Malmo.

Advices from Valparaiso of Nov. 16th state that a bill has passed the Senate of Chili authorizing the establishment of a new line of telegraph from Caldera to Loto, connecting with the intermediate ports.

"PUCK'S" TIME BEATEN.—WONDERFUL TRAVELS OF A TELEGRAPHIC DISPATCH FROM AUSTRALIA.

A few days since the *Chronicle* published congratulatory telegrams which passed between the Mayor of Adelaide, in Southern Australia, and the Mayor of San Francisco. The telegrams referred to had to pass over 16,000 miles to reach their destinations, and as this is the first telegraphic message that ever was sent so far, we give the route over which it came as an item that may prove of interest to the readers of the *Chronicle*. It came across the Australia continent, under the Indian Ocean, through the Sunda Islands to Hindostan, under the Arabian Sea, through the Red Sea, over the Isthmus of Suez, under the Mediterranean, over Western Europe to London, under the Atlantic Ocean to New York city, and overland to San Francisco. It was received and published in San Francisco on the same day that it was dated, the science set nature's laws at defiance. If the forwarding machinery were perfect and expeditious in its workings, such a telegram ought to reach the Pacific coast within a few moments after its departure from Australia, which would be, by our solar time, nearly fifteen hours before it was sent! As, if it was despatched at 6 o'clock in the morning from Melbourne, it would reach San Francisco at 3 o'clock in the afternoon of our previous day.—*San Francisco Chronicle.*

DEVICE FOR SIGNALING BETWEEN TRAINS.

Mr. R. K. Boyle, of Brooklyn, N. Y., is the inventor of a system of signaling, by electricity, between trains or locomotives on the same track, to prevent collisions, alike by trains meeting when traveling in opposite directions as by one train overtaking another, and serviceable especially in going round curves or through tunnels, and at night or in foggy weather. It consists of an arrangement whereby the circuit is formed by or through the trains on the same track, the rails of said track, and a third or ordinary rail of an adjacent track or additional rail of the first mentioned track, without insulating any of the rails; also in a circuit closer, carried by each train, and adjustible by the engineer, relatively to one of the rails, to open and close the circuit. This part of the invention likewise embraces a peculiar manner of hanging and operating the circuit-closer, whereby, when adjusted to break the circuit, it is both raised and drawn inwards towards the side of the train, so as to be out of the way. A wire brush, forming part of the circuit-closer, is used to establish contact with the rail.

TELEGRAPHIC IMPROVEMENTS AND EXTENSIONS BY THE WESTERN UNION TELEGRAPH COMPANY ON THE PACIFIC COAST.

The Western Union Co. are making large improvements and extensions in Oregon. A new cable has just been laid between San Juan and Lopez Islands, renewing connection between Victoria and the main land. Their wires have also been extended from Seattle to Port Townsend *via* Port Blakely, Port Madison and Port Gamble. A two wire line has been completed along the N. Pac. R., and double lines along the Or. & Cal. R. as far as completed.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
January 1, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular.

GENERAL INFORMATION.

Wetumpka, Ala., re-opened. (Former notice is disregarded by several offices.)
Brooklyn, Cal., closed.
Markleeville, Cal., closed.
Woodford, Cal., closed.
Big Coolie, Dac., closed.
Little Coolie, Dac., closed.
Snake River, Idaho, re-opened.
Stoner Station, Idaho, closed.
Rock Island Junction, Cook Co., Ill. P. O. A. is Englewood, Cook Co., Ill.
Mill Shoals, Ill., closed.
Rome, Jones Co., Iowa, changed to Olin, Iowa.
Martello, Iowa, should read Martelle, Iowa.
Terry's Station, Mich., closed.
Mackinaw City, Mich., closed.
Dallas, Minn., closed.
Etter, Minn., closed.
Kearney Junction, Neb., is now a W. Union office, sq. 522.
Spencer Springs, N. Y., closed.
Woodstock, N. Y., closed.
East Liberty, Pa., P. O. A. is "Station A," Pittsburgh, Pa.
Henderson Farm, Pa., changed to New London, Pa.
Lehigh Summit, Pa., closed.
Southampton, Pa., changed to Glencoe, Pa.
Olcopolis, Pa., is another line office; erase the square number.
Messages for Fishbach, Pa., may be taken and sent to Pottsville, Pa., from which office they will be delivered. Charges for delivery, ten cents.
Berkshire, Vt., should read 30 2 30 Stanstead, Que., Mont. Co.
Island Pond, Vt., should read 30 2 30 Stanstead, Que., Mont. Co.

The additional word rate for offices on other lines in W. T., published in last JOURNAL, is for five words or less.

Port Blakly, W. T., should read Port Blankly, W. T.
Worthington, Wis. No office at this point.
Bitter Creek, Wy., is now an other line office; tariff for other lines, 70 5. 564 Rawlins, N. Y.
Medicine Bow, Wy., is now an other line office; tariff for other lines, 65 4. 556 Laramie City, Wy.

NEW OFFICES.

*Cherokee Flat, Cal., 25 *10 Oroville, Cal., ck. San Francisco.
808 Rossville, Ill.
367 Centre Junction, Iowa
367 Olin, Iowa.
367 Paralta, Iowa.
367 Tipton, Iowa.
367 Virogwa, Iowa.
384 Tickfaw, La.
21 Arlington, Mass.
21 Lexington, Mass.
21 Milton, Mass.
148 Standish, Mich.
322 Prairie, Miss.
399 Beaver, Mo.
46 Sterling Junction, N. Y.
191 Independence, O.
191 Millersburg, Holmes Co., O.
58 Gouldsboro, Luzerne Co., Pa.
122 Glencoe, Pa.
76 Hummelstown, Pa.
130 New London, Pa.
292 Brentwood, Tenn.
321 Pinson, Tenn.
311 Stewart's Station, Tenn.
470 Overton, Texas.
* Alderson, W. Va., { 65 4 203 Huntington, W. Va. / 50 3 133 Greenbrier, White Sulphur Springs, W. Va.

* Each additional five words or less.

OFFICES HAVING "SPECIAL SHEET A."

Tariff to Hummelstown, Pa., will be 25 cents more than Harrisburg, Pa., or 35 cents more than Philadelphia, Pa., whichever gives cheaper rate. If the rate to square 76 is less than the added rates, use the square rate.

WILLIAM ORTON, President.

WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, December 30, 1872.

Executive Order, No. 142.

All Business and Complimentary Franks issued by this Company for the year 1872, are hereby continued in force until the 31st day of January, 1873.

GEO. H. MUMFORD,
Vice-President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Dec. 26th, 1872.

To all Transfer Agents:

Mr. J. B. Tree has removed his head-quarters from Jackson, Tenn., to Louisville, Ky.

G. H. MUMFORD, Vice-President.

EXECUTIVE OFFICE, New York, January 20, 1873.

From and after this date, all money order offices in G. W. Trabue's district will be transferred to J. B. Tree's district, and all money order offices in Jas. Compton's district will be transferred to D. Flanery's district.

G. H. MUMFORD, Vice-Pres't.

SALE OF STOCK OF THE NEW YORK, NEWFOUNDLAND AND LONDON TELEGRAPH COMPANY.

Negotiations, which have been in progress for some time past for the purchase of most of the stock of the New York, Newfoundland and London Telegraph Company, have been completed. The stock is purchased by a combination of English capitalists at 90, and the proprietorship of the company is now mostly in English hands. The organization of the company will, for the present, at least, remain intact—the management, of course, being transferred to the purchasers. The issued capital of the company is $4,300,000, and it is understood to be intended to have it placed upon the list and quoted at the London Stock Exchange.

The following will be the Board of Directors under the new organization: Sir James Anderson, Julius Beer, E. L. S. Benzon, Cyrus W. Field, Henry Weaver. Mr. Weaver will be the managing director.

Messrs. J. S. Morgan and Company announce that they are authorized to receive subscriptions for 33,500 shares of £20 each, being part of the issued capital of the New York, Newfoundland, and London Telegraph Company, an undertaking working with the Anglo-American and French Atlantic Telegraph Company. The authorized capital of the Company is £1,200,000, and the issued capital £863,520. The Company has exclusive working agreements with the Anglo-American, French Atlantic and Western Union Telegraph Companies for fifty years, from January, 1870, determinable by the Anglo-American or French Atlantic Telegraph Company in 1905, upon five years' previous notice. Under these agreements the cable receipts belonging to the companies form a joint purse, of which, until the completion of a new cable which the French Atlantic Company is about to submerge, the Anglo-American and Newfoundland Companies receive together 63½ per cent., while the French Atlantic Company takes 36½ per cent. After the completion of this new cable, the latter undertaking will be apportioned 48 per cent., and the two former 52 per cent. The Newfoundland Telegraph Company possesses 1,531 miles of land lines, and 696 miles of cables connecting the American cables with all the principal telegraph wires of the United States.—*The Financial Chronicle.*

MR. W. D. SCHRAM, formerly of the No. 21 Wall street office, has been transferred to the General Office, 145 Broadway, and placed in charge of the Receiving and Delivery Departments.

SUCCESSFUL EXPERIMENTS WITH THE STEARNS' DUPLEX. WORKING A 2000 MILE CIRCUIT. NEW WIRE.

SOME interesting experiments have recently been made on the Western Union lines to determine the practicability of working the Stearns duplex instruments direct through long distances. On Thursday, December 12th, a circuit was made up from Plaister Cove to Chicago, a distance of about 2,000 miles, with duplex repeaters at Bangor, New York and Buffalo. The result of this trial was very satisfactory, On Tuesday, the 17th inst., another circuit was made up from New York to Buffalo *via* Hornellsville and back, thence to S. Johns, N. B., and back to Boston—about the same length as the previous one, with repeaters at Buffalo, New York and St. John's, The "specials" to Boston were then sent through the entire distance and excellent time made. The experiments were in all respects an unqualified success.

A new wire, No. 6 gauge, has been completed between this city and Cincinnati, upon which the duplex system is worked very satisfactorily. Only one repeater is found to be necessary upon this circuit.

BORN.

WOODARD.—At Waterford, Pa., December 15, 1872, to Anson H. Woodard, Manager W. U. Tel. office, a son.

MARRIED.

BETTS—WILCOX.—At Corunna, Mich., November 21, 1872, at the residence of the bride's parents, Mr. Fred. Betts, Manager W. U. Tel. office, Owosso, Mich., to Miss Ella Wilcox, of Corunna.

COY—POTTER.—At Hamilton, O., December 10, 1872, by Rev D. J. Storr, W. H. Coy, Manager W. U. Tel. office, to Miss Vickie Potter, daughter of Dr. S. H. Potter, all of Hamilton.

FOSTER—CALLENDAR.—At North Lewisburg, O., December 10, 1872, by Rev. B. Seever, C. H. Foster, Supt. Telegraph, I. B. and W. Ry., to Miss Cora Callendar.

HARDWIDGE—DAVY.—At Manafield, O., December 1, 1872, by Rev. S. A. Bronson, Mr. Charley Hardwidge to Miss Lizzie Davy, formerly Manager W. U. Tel. office, Sewickley, Pa.

HOWARD—OGILVIE.—At the residence of the bride's parents, near Paducah, Ky., December 10, 1872, John W. Howard, operator W. U. Tel., Blandville, Ky., to Miss Laura M., daughter of Hon. John W. Ogilvie.

HUNGERFORD—WELCH.—At the residence of the bride's parents, Danville, N. Y., November 21, 1872, by Rev. D. Lisenring, V. R. Hungerford, Manager W. U. Tel. office, to Miss Mary E. Welch, of Dansville.

LOGAN—COBB.—At Pensacola, Fla., November 27, 1872, at the residence of the bride's father, by Rev. W. C. Carter, Mr. Wm. T. Logan, of Georgia, Manager Pensacola Tel. office, to Miss Annie R. Cobb, of South Boston, Mass.

RIDDICK—HAMILTON.—At the Methodist Church, Marion, Ala. December 15, 1872, by Rev. J. Bancroft, J. H. Riddick, Manager W. U. Tel. office, Marion, to Miss Viola Hamilton, of Perry.

RIDDLE—HALSEY.—At the Parsonage, Mariner's Harbor, Staten Island, October 23, 1872, by Rev. Mr. Taylor, Mr. S. D. Riddle, Manager W. U. Tel. office, Occidental Hotel, New York City, to Miss Virginia F., daughter of Capt. W. J. Halsey.

SHINDEL—HUMMEL.—December 25, 1872, by Rev. M. S. Shindel, assisted by Rev. James Curns, R. H. Shindel, Manager W. U. Tel. office, to Miss Mary Hummel, both of Selins. Grove, Pa.

WAMBLE—ANDERSON.—At the residence of the bride's father, December 3 1872, by Rev. J. Bancroft, A. M. Wamble, Manager W. U. Tel. office, Marion Junction, Ala., to Miss Hattie Anderson, of Marion.

DIED.

YMOND.—In New London, Connecticut, December 1, 1872, Reuben S. Raymond, Manager W. U. Tel. office, aged 42 years.

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THE TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ORGANIZED IN 1867.

The heirs of deceased members receive one dollar from each of the surviving members of the Association.

All engaged in the Telegraphic service are eligible to membership, if in good health and of good character and habits. Initiation fee, $1.50.

Blank forms of Application and Restoration may be had of the Secretary, or of any of the following Agents:—

Augusta, Ga., ...J. M. Crowley.
Baltimore, Md., ...Archd. Wilson.
Buffalo, N. Y., ...J. W. Tillinghast.
Cincinatti, O., ...F. A. Armstrong.
Chicago, Ill., ...W. C. Long.
Cleveland, O., ...H. L. Melton.
Clinton, Ia., ...E. O. Wait.
Erie, Pa., ...G. W. Baxter.
Harrisburg, Pa., ...H. A. Clute.
Indianopolis, Ind., ...D. C. Hinsdale
Mobile, Ala., ...Wm. Sandford.
Memphis, Tenn., ...J. J. Fowler.
Milwaukee, Wis., ...D. H. Henshaw.
New Orleans, La., ...Jas. T. Alleyn.
Nashville, Tenn., ...E. C. Boyle.
Philadelphia .....Jas. Merrihew.
Phillipsburg, N. J., ...John Fuller.
Pittsburg, Pa., ...S. L. Gilson.
Richmond, Va., ...R. M. J. Paynter.
Syracuse, N. Y., ...D. L. Pike.
St. Louis, Mo., ...J. P. Cassidy.
San Francisco, ...J. S. Urquhart.
Seattle, Wash. Ter., ...F. H. Lamb.
Toronto, Ont., ...A. Hunter.*
Washington, D. C., ...M. Marean.
White River Junc., Vt., G. W. Gates.

Additional Agents will be appointed as soon as practicable.

Applications for membership should be endorsed by the Agent through whom they are made.

Members in communicating with the Secretary will always state the Number of their Certificate.

A. S. BROWN, Treas.
D. R. DOWNER, Secy.

* A. Hunter is Agent for all of Canada.

TELEGRAPHERS' INSURANCE ASSOCIATION.

The acknowledgment of receipt on any assessment is to be understood as an acknowledgment for all previous assessments.

NOS. 34, 35, & 36.

4	26	27	28	31	33	39	44	53	54	55
65	70	78	82	83	84	88	89	97	99	100
114	120	140	141	142	144	146	148	154	156	158
160	164	166	172	179	181	189	190	191	193	197
198	200	208	213	215	218	227	230	231	238	242
246	252	254½	255	256	258	291	303	311	350	353
379	381	385	388	391	398	414	418	422	430	431
433	451	453	455	456	457	483	484	511	512	532
542	549	553	566	569	570	574	575	584	586	597
617	628	648	649	652	656	660	661	670	671	694
703	717	723	724	728	730	732	733	737	738	741
743	744	750	751	756	764	773	778	780	790	791
804	820	823	831	851	859	874	876	883	897	901
905	920	927	930	941	942	954	955	956	957	958
959	960	963	964	978	979	991	992	1005	1006	1023
1030	1031	1032	1033	1034	1039	1042	1043	1044	1950	1058
1061	1066	1073	1074	1075	1076	1080	1084	1085	1100	1101
1102	1103	1105	1106	1107	1108	1110	1112	1113	1115	1117
1119	1120	1121	1122	1123	1130	1131	1139	1145	1146	1151
1152	1164	1167	1170	1191	1201	1208	1209	1215	1223	1234
1228	1231	1233	1234	1235	1237	1238	1239	1240	1241	1242
1257	1262	1264	1268	1269	1270	1273	1276	1282	1287	1288
1290	1328	1361	1371	1389	1393	1415	1416	1417	1418	1426
1428	1445	1448	1450	1457	1458	1483	1485	1486	1487	1488
1490	1496	1502	1505	1510	1511	1514	1528	1539	1550	1537
1539	1541	1542	1543	1546	1548	1550	1552	1561	1562	1564
1569	1573	1577	1578	1583	1585	1597	1620	1631	1639	1646
1648	1660	1661	1662	1663	1664	1665	1667	1672		

No. 34.—447 1187 1628

No. 35—931 1001 813

Notwithstanding the triple assessment we were compelled to issue, members have been very prompt in remitting. About 800 have so far sent in their three dollars each to the Secretary, and there is sufficient in the hands of agents to warrant us in stating that the delinquent list will be smaller than ever before.

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

Members to whom the following certificates have been issued are in arrears. Notices by mail have been sent to each of them, and to those in arrears on assessments, up to No. 32, a blank form of restoration has been sent, which must be properly filled out and endorsed by an agent, if restoration to membership is desired.

ASSESSMENTS DUE.

Nos. of Certificates.			*Nos. of Certificates.*		
40	26 to 36	inclusive.	118	22 to 36	inclusive.
253	31 to 36	"	259	28 to 36	"
262	28 to 36	"	263	24 to 36	"
264	24 to 36	"	265	24 to 36	"
266	24 to 36	"	284	27 to 36	"
287	27 to 36	"	302	31 to 36	"
315	26 to 36	"	318	25 to 36	"
340	29 to 36	"	386	27 to 36	"
412	31 to 36	"	417	26 to 36	"
435	26 to 36	"	437	26 to 36	"
440	28 to 36	"	443	22 to 36	"
446	29 to 36	"	461	27 to 36	"
462	24 to 36	"	477	26 to 36	"
485	30 to 36	"	488	23 to 36	"
490	29 to 36	"	516	28 to 36	"
551	26 to 36	"	563	24 to 36	"
581	31 to 36	"	583	26 to 36	"
585	22 to 36	"	588	28 to 36	"
595	25 to 36	"	608	30 to 36	"
616	31 to 36	"	619	30 to 36	"
623	32 to 36	"	631	29 to 36	"
939	30 to 36	"	643	31 to 36	"
652	32 to 36	"	666	25 to 36	"
686	23 to 36	"	716	29 to 36	"
704	31 to 36	"	720	32 to 36	"
726	32 to 36	"	727	26 to 36	"
747	23 to 36	"	762	26 to 36	"
763	28 to 36	"	770	23 to 36	"
771	28 to 36	"	774	31 to 36	"
777	26 to 36	"	784	25 to 36	"
787	31 to 36	"	795	32 to 36	"
814	26 to 36	"	837	23 to 36	"
844	25 to 36	"	868	32 to 36	"
878	25 to 36	"	882	26 to 36	"
900	24 to 36	"	907	28 to 36	"
910	29 to 36	"	914	28 to 36	"
934	26 to 36	"	935	25 to 36	"
948	22 to 36	"	951	26 to 36	"
953	24 to 36	"	968	23 to 36	"
994	25 to 36	"	1017	24 to 36	"
1030	31 to 36	"	1035	26 to 36	"
1045	23 to 36	"	1053	32 to 36	"
1060	26 to 36	"	1068	23 to 36	"
1079	31 to 36	"	1086	26 to 36	"
1091	31 to 36	"	1095	23 to 36	"
1114	23 to 36	"	1118	27 to 36	"
1129	24 to 36	"	1132	28 to 36	"
1133	30 to 36	"	1137	32 to 36	"
1166	31 to 36	"	1168	32 to 36	"
1169	32 to 36	"	1172	25 to 36	"
1176	23 to 36	"	1177	32 to 36	"
1181	32 to 26	"	1188	26 to 36	"
1189	25 to 36	"	1192	31 to 36	"
1202	30 to 36	"	1203	25 to 36	"
1211	25 to 36	"	1212	25 to 36	"
1214	28 to 36	"	1216	31 to 36	"
1219	26 to 36	"	1229	32 to 36	"
1230	25 to 36	"	1243	30 to 36	"
1244	32 to 36	"	1246	30 to 36	"
1247	27 to 36	"	1249	28 to 36	"
1250	26 to 36	"	1253	26 to 36	"
1268½	31 to 36	"	1273	25 to 36	"
1280	25 to 36	"	1289	32 to 36	"
1293	26 to 36	"	1297	28 to 36	"
1299	30 to 36	"	1301	26 to 36	"
1302	28 to 36	"	1305	28 to 36	"
1316	31 to 36	"	1319	32 to 36	"
1324	32 to 36	"	1330	28 to 36	"
1338	32 to 36	"	1341	32 to 36	"
1362	27 to 36	"	1392	28 to 36	"
1397	32 to 36	"	1408	32 to 36	"
1411	31 to 36	"	1420	32 to 36	"
1422	31 to 36	"	1434	31 to 36	"
1435	28 to 36	"	1436	31 to 36	"
1441	26 to 36	"	1442	26 to 36	"
1447	31 to 36	"	1460	31 to 36	"
1472	32 to 36	"	1473	31 to 36	"
1478	31 to 36	"	1512	32 to 36	"
1523	31 to 36	"	1525	32 to 36	"
1533	31 to 36	"	1534	31 to 36	"
1536	32 to 36	"	1540	31 to 36	"
1544	31 to 36	"	1567	32 to 36	"
1574	32 to 36	"	1575	31 to 36	"
1592	31 to 36	"	1598	32 to 36	"
1602	32 to 36	"	1603	32 to 36	"
1618	32 to 36	"	1627	32 to 36	"

INGENIOUS AND NOVEL METHOD OF ARRANGING ELECTROPOION BATTERIES.

A San Francisco correspondent communicates the following:

"An Electropoion battery of five cells was recently shipped to a repair station in the third district of this division, to be used for testing purposes. Shortly afterwards the station was visited by the District Superintendent, who reports to this effect:"

"When I reached . . . I found his main battery in circuit and working nicely (?) He had no practical knowledge of batteries, and had received no instructions, but his ingenuity was equal to the emergency. He placed the jars, zinc and porous cells in proper position, then packed dry crystals of bi-chromate of potash around the zincs, and partially filled the tumblers with water, placed some mercury in each porous cup, and immersed therein the platinum button connectors; the free ends of which he connected to the zinc arms, thus entirely dispensing with the carbon plates. Everything being 'set' as described, he filled up the porous cups and tumblers with sulphuric acid, until every cell 'boiled.' The battery was then switched into circuit, and our rural electrician rested from his labors, with the happy consciousness of a duty well performed."

AMERICAN genius stands preëminent in the perfection of mechanical appliances to supersede manual work. Perfect invention to this end is, indeed, the offspring of necessity in the United States, where scarcity of hand labor has forced forward, to an almost inconceivable degree, human ingenuity In this special branch of invention, there can be no dispute that the Yankee can give the world long odds and beat him. In England, where labor has been always abundant, and until of late, cheap, the genius of invention has trodden rather the higher than the humbler path of life, has tended rather to achieve great ends than to effect simple purposes, has given mechanical handicraft less attention and devoted itself to great physical revolutions. In America, it is far different; there is scarcely an industry too humble, a labor too mechanical or common to escape the attention of the inventor, who, with an almost infinite ingenuity, sets himself to work to conbine all the known mechanical movements and to invent new ones, until the sleight of the hand of the operator is imitated to the life, and the dead metal is endued with life and power with which flesh and blood cannot compete.—*Engineering.*

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

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Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, JANUARY 1, 1873.

POSTMASTER-GENERAL'S REPORT.

In our last issue we reviewed, at some length, that portion of the Postmaster-General's Report relating to the telegraph, our criticisms being more particularly directed to the erroneous statements contained therein. It has been our aim to discuss the questions involved in the governmental acquisition of the telegraph in a fair and candid spirit, and with such intelligence as the long experience and familiarity with the business of telegraphing, enables us to employ. We have not imputed to the Postmaster-General any improper motives in the presentation to Congress of his singularly inaccurate and indefensible statements relating to the telegraph. The subject is too vast and complicated to be understood by a merely superficial examination, such as a Cabinet Officer, burdened with the cares and responsibilities of an important department, is able to devote to it. A business involving the employment of a capital of over sixty millions of dollars, of ten thousand skilled laborers, of six thousand separate places where it is transacted, and an annual expenditure of over seven millions of dollars, cannot be comprehended or grasped in all its details, except by a long and careful study of the subject by persons qualified by study and experience, for the office. The mere fact that the Postmaster-General estimates the value of such a business at less than one-sixth of the capital represented in it—a capital which, for the most part, has a market value of over 80 per cent. of its par value—shows, not only that his estimate of its value is not shared by that portion of the public who have money to invest, but clearly indicates that he has not given the subject the careful and intelligent consideration to which it is due. Regarding the cost of the lines, the Postmaster-General says:

"The majority of lines in this country have been built very cheaply. Their entire cost, including patents, being probably much less than $10,000,000. *In fact, the poles have been erected in many cases entirely without cost to the telegraph companies, by the railroads along whose tracks they are built.*"

Suppose the railroad companies had not only "erected" the poles, but furnished them, as well as the wires thereon, how would this fact affect the question of cost? In other words, what bearing has the question of who pays for a thing upon the cost of production?

A most striking commentary on the above statement of cost is presented in the Postmaster-General's Report in the only estimate for constructing a similar extent of lines furnished by him, *which gives the cost at eighteen and a quarter millions of dollars, providing the wire is imported free of duty.* When it is considered that wire is one of the principal items of cost, and that the duties on it amount to sixty-eight per cent., it will be perceived that the Postmaster-General's statement of cost is more than doubled by the only authority he brings forward to establish it. Supposing, however, that it could be shown that the cost of building a system of telegraphs, equal to those now in operation in the United States would not exceed twenty-five or thirty millions of dollars, would this fact prove that the Government could acquire them, or would have a right to acquire them at that sum?

Section 8 of the Act of Congress, Approved July 24, 1866, upon which the Postmaster-General relies for obtaining possession of the telegraphs now in operation in this country, provides as follows:

"That the United States may, at any time after the expiration of five years from the date of the passage of this Act, for postal, military or other purposes, purchase all the telegraph lines, property and effects of any or all of said companies, at an *appraised value*, to be ascertained by five competent, disinterested persons, two of whom shall be selected by the Postmaster-General of the United States, two by the company interested, and one by the four so previously selected."

Now, what is the meaning of the word *value* as applied to the telegraph? Does it mean the cost merely of the poles, wire, machinery, patents and other property, or does it include also its business, good-will, ability to earn money, etc.? The Postmaster-General assumes that it means simply the former, and says:

"It may be proper to state that one of the companies has advanced the theory that the Government should purchase, not only its telegraph lines, property and effects, but also the good-will of its business, based on present and prospective profits. As it is difficult to see how mere good-will can be brought before the appraisers, under the law, as it stands, it is, perhaps, unnecessary for me to discuss at much length, the merits of this claim."

If the Postmaster-General's definition of value, namely, that it is synonymous with cost, is correct, we are sadly in need of a new dictionary, for all of those hitherto published give an entirely different meaning to the word. Webster's definition of value is as follows:

"*The property or properties of a thing which render it useful; or the degree of such property or properties; worth; utility; importance; rate or estimated worth; price deemed or accepted as equivalent to the utility of anything; amount obtained in exchange for a thing.*"

It will be perceived that Webster, in no instance, makes the *value* of a thing depend upon its *cost*, and we must confess our surprise that a gentleman of Mr. Creswell's well-known ability could fall into so conspicuous an error. To illustrate the absolute dissimilarity of the two words, and the entire absence of any necessary relation between them, let us consider the *cost* and *value* of an important invention. Take, for example, Stearns' Duplex Telegraph, the cost of which to the inventor was inconsiderable, but which is already earning the Western Union Company the interest on a million dollars per annum, and the value of which is almost inestimable. Or, on the other hand, take the Morse patent, whose cost to the company was very great, but which, having expired, is now without any value whatever.

It seems scarcely necessary to further discuss the question of the dissimilarity between the cost and value of a thing, as it must be apparent to every reflective mind, but we will produce one more practical illustration, on account of its direct bearing upon the case in point.

Mr. Frank Ives Scudamore, the Director-General of the Post Office Telegraphs in England, in his testimony before the select committee on the Electric Telegraphs bill, says: "The sum that is charged by the companies for the construction of works generally includes a very large expenditure from first to last in getting up their plant of all kinds; it includes the cost of their leasehold property, and it includes the cost of their patents, which is very considerable in each year, and it also includes the preliminary expenses in getting bills before Parliament; it includes expense of every kind; it is not simply the manufacture of the mere posts and wires."

Question by Mr. GOSCHEN: "Would you be able to put in a statement and analyze the two and a half millions of the companies? You are going to buy the assets of the companies, and some of those assets represent property, that is to say, posts and wires and instruments; assets which exist at this moment; another portion of it represents no value present at all; that is to say, a certain amount which has been spent on Parliamentary proceedings, patents which have expired, and so forth. Would you be able to show what amount is to be placed in each of those to two classes?

Answer by Mr. SCUDAMORE:

"I should be very glad, indeed, if you would not ask me to put in any statement of my views as to the *value* of their property."

Question by Mr. GOSHEN:

"I do not mean the *value;* I mean the *cost.* The capital accounts of the various companies will show what they have done with their capital, and it would enable the committee to see what the public are actually buying?"

Answer by Mr. SCUDAMORE;

"I am quite sure of that; *it would enable the Committee to see what they would buy as far as the expenditure of the companies is concerned; but that is not the only sum involved in buying the trade of a company. For instance, if I may take a very low case as an illustration, if you buy a public-house you buy something more than the building, and the pots and barrels and beer engines; you buy the trade which the man has acquired.*"*

The above quotation from Mr. Scudamores testimony shows the view which the British Government took of their obligations to the telegraph companies whose property they proposed to acquire, and which they did acquire by paying for it a sum equal to twenty years' profit. Mr. Creswell says, in his recent report that the profit of the Telegraph Companies in the United States for 1872, was $3,500,000, and if the statement is correct the lines are worth, on the basis of the purchase of the English lines, $70,000,000.

But, says Mr. Creswell, "the manner in which the British government recently acquired the telegraphs cannot be cited as a precedent for the United States. There was no such previous agreement between Her Majesty's government and the companies of the United Kingdom as is contained in our Act of 1866."

* *Special Report from the Select Committee on the Electric Telegraphs Bill; together with the minutes of evidence taken before them. Ordered by the House of Commons to be printed, 16th July, 1868. Page, 152.*

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The above sentence is a most remarkable one emanating as it does, from a high officer of the government, and taken in connection with the depreciatory manner in which the telegraph property of the country is alluded to. Let us analyze it and see what it actually means. It is not pretended that the British government paid too much for the property which they purchased, and which was seven times as much as Mr. Creswell estimates a similar property to be worth here, but simply that there was no such agreement between the British government and the telegraph companies as exists by virtue of the acceptance by the companies in the United States of the Act of 1866. Are we to infer by this that, if the British government had possessed such a right as the Act of 1866 gives to our government, it would have paid the telegraph companies less than their property is worth? Or are we to infer that our government is less fair in its dealings with its own citizens than the British government is with its subjects? Either the one conclusion or the other must inevitably be drawn from the premises laid down. We are unwilling however to believe that our government is disposed to treat its citizens in so unfair a manner, or that Mr. Creswell would knowingly recommend it. On the contrary, we incline to believe that this view of the case was conceived by some assistant of the Postmaster-General, whose desire to acquire the property for the department at a cheap rate, overcame his discretion or notions of equity.

But admitting, for the purpose of illustration, the improbable hypothesis that our Government is capable of taking advantage of a legal right to force a portion of its own citizens to sacrifice a large and important property, regardless of all questions of justice or equity involved in the case, we deny that the United States has acquired any such right over the property of the telegraph companies which accepted the conditions prescribed in the Act of July 24th, 1866. This Act, so far as it relates to the acquisition of the property, simply provides that the United States may purchase it at an appraised *value*, to be ascertained by five competent disinterested persons.

Now, according to Webster's definition of value, the value of the telegraphs cannot be less than the market price, because that can always be "obtained in exchange for them;" nor can it be less than "the price deemed equivalent to their worth, utility, importance or usefulness;" and the British Government, the only Government which has ever purchased an extensive telegraph system, wholly constructed by private enterprise, has already established the precedent that the value of the lines and property of a telegraph company is equal to the sum of twenty years' net profits, which would make the value of the telegraphs in the United States at least $70,000,000. This sum, however, is but the commencement of the amount which the Government will be obliged to expend in the event of its going into the business of telegraphing.

If the Postmaster General's estimate of the increase in the telegraphic correspondence of the country, under the proposed average reduction of the tariff to 33⅓ cents per message, is correct, and the number of messages annually transmitted is increased from 15,000,000 to 30,000,000, the satisfactory performance of this increased traffic will require a proportionate increase in facilities, and, while these, in a great measure, may be supplied by the introduction of the duplex apparatus, there would still exist the necessity for the expenditure of a vast sum of money in the construction of additional lines.

The transmission of telegrams is totally unlike the transmission of letters; an increase in the number of letters is easily and readily provided for by the purchase or manufacture of a few extra bags, but the increase in the number of messages, transmitted over the wires, can only be provided for by proportionately increasing the number of circuits and operators required for their transmission.

PERMANENT ENLARGEMENT OF THE JOURNAL. HOW TO INCREASE ITS CIRCULATION.

A COMMUNICATION from a very intelligent correspondent, which appeared in our last issue, suggests a plan whereby the circulation of the JOURNAL would be greatly increased. While we fail to appreciate the force of the ideas given, we can fully understand the benefit which would arise to the recipients of the paper upon the terms suggested.

The knowledge we have of our correspondent enables us to feel assured of his earnestness, and of his belief that if every employé was furnished regularly with each issue of the JOURNAL, its usefulness would increase sufficiently to defray the increased expense. Of this we have no doubt; but it might have occurred to our correspondent to have placed the matter in another light; that the JOURNAL contains other matter than official regulations, and that the proper study and use of its contents would prove of much greater profit and utility to the individual reader than to the company who seeks to instruct and elevate him. The company needs the service of men of much higher scientific attainments than are to be found in the ranks of the mass of the employés, and is seeking, by the only means in its power, to impart the necessary education to enable those who are sufficiently interested in their future advancement in life, to fit themselves for the positions which will be open to them when qualified to fill them. The case stands thus: The officers of the Western Union Company, in their desire to elevate their employés, morally and pecuniarily, established a periodical, at great expense, for that purpose, as well as to disseminate official instructions. Instructive scientific articles are written and illustrated, with great labor; the news affecting the interests of the telegraphist is collected from the entire world; editorials upon the current telegraphic topics appear in every issue, and finally its columns are open to contributions from all who have anything of interest to communicate. In view of these self-evident facts, it seems hardly necessary for us to say that we do not agree with the views of our correspondent, more particularly where he says, "Some feel that if they must pay for information which it is to the interest of the company they receive, the company will wait a long time before they receive it." Of course the information contained in the JOURNAL is entirely valueless to such characters, not even being worth the less than two cents per week, which is what the subscription price amounts to. There are people in this world who do not believe in placing their money out at interest. It is this class for whom our correspondent pleads.

We are glad to have received this communication, inasmuch as it has afforded us the knowledge why every telegrapher is not a subscriber to the JOURNAL, and furnishes an opportunity to present such reasons to non-subscribers that they cannot now fail to see the advantage and self-interest to be derived in becoming readers and subscribers. That many of this class are throwing off the feeling of indifference, both as to the success of the paper and of themselves, is sufficiently evident from the large number of new subscribers which have appeared within the past few weeks, and the fulness of our columns of correspondence is amply indicative of awakening interest.

These indications have been so encouraging that it has been decided to enlarge the paper. With the issues for Dec. 2nd and 16th, the JOURNAL appeared with sixteen pages, and for the future this size will be maintained. This will afford thirty-six columns of reading matter which will be of general interest to every telegraph employé, and not alone to them, but to every one interested in truth and science for their own sakes. Will not every reader of the JOURNAL take the trouble to show the paper to his friends, not only in the business, but outside, and explain to them its merits, its cheapness, and its policy, with a view of inducing subscriptions. In this manner the sphere of its usefulness will be best advanced, and the encouragement given to its projectors and supporters will undoubtedly be rewarded by new improvements and increased efforts (if possible), to reciprocate in, and retain that bond of sympathy and accord which has now become so strong between the officers of the Western Union Telegraph Company and their employés.

Attention is called to the advertisement, in this issue of the Journal, of Dr. L. Bradley, of Jersey City. He has discontinued the manufacture of Telegraph Instruments, and is now manufacturing his "Universal Apparatus" for electric measurement. This apparatus consists of a combination of the Tangent Galvanometer and Rheostat into one instrument, in a compact and portable form. This fact alone should, and probably will, cause it to come into general use, and if the performance of the instrument only nearly equals the ecomiums of its friends, it will be evident that the Doctor has conferred a benefit upon the profession by its introduction.

His naked wire helices are too well known to require comment.

GEN. W. F. SMITH, President of the International Ocean Telegraph Company, has gone to England on business of the company.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY,
October, 1872.

APPOINTMENTS.

Fannie M. Browne.....Manor, L. I.
Fred. Jesson.....Quarentine, L. I.
Kate Hickey.....Brooklyn, L. I.
L. W. Ebell..... " "
W. J. Cook.....145 Broadway, N. Y.
B. DeKlyn.....145 " "
E. S. Risdon.....145 " "
Leonard Cox, (cashier).....145 " "
S. L. Amies.....Cotton Exchange, N. Y.
W. O. Shipman.....Broadway and 34th st., N.Y.
W. S. Williams.....Cosmopolitan Hotel "
Mary L. Case.....Duane street, "
H. J. Brower.....Fulton Market, "
P. A. Lewis.....335 Broadway, "
Louise Symonds.....Antigonish, N. S.
Miss L. Harley.....Halifax, "
Nellie S. Sponagle.....Lunenburg, "
Samuel Prat.....Wolfville, "
W. S. Gross.....Hillsboro, N. B.
F. H. Cleveland.....Sussex, "
Henry C. Bliss.....Bangor, Me.
Geo. S. McCord..... " "
M. L. Eells.....Camden, "
I. S. Hall.....Clinton, "
Chas. A. Merrill.....E. Saugus, Mass.
W. H. Bailey.....Freeport, Me.
Miss M. J. Nutter.....Portsmouth, N. H.
A. C. Preble.....Portland, Me.
Frank A. Munsey..... " "
D. G. Stoughton.....Charleston, N. H.
A. C. Hayden.....Conway, "
A. P. Gage.....Hookseth, "
Miss E. M. Freeman.....Lowell, Mass.
Nellie M. Russell.....Amherst, "
H. S. Pettingill.....Boston, "
G. F. McPhilomey..... " "
J. A. Kennedy..... " "
Miss A. S. Tilyea.....Canton, "
J. C. Parker.....Duxbury, "
W. R. Hendrick.....Fair Haven, Conn.
O. J. Seaver.....Hartford, "
Lizzie Holford.....New Haven, "
R. E. Capron.....Providence, R. I.
Wm. Stewart.....Pittsfield, Mass.
A. B. Snow.....Wickford, R. I.
Miss E. Shackley.....Waterbury, Conn.
D. C. Smith.....Tiverton, R. I.
Chas. E. Arnold.....Albany, N. Y.
J. V. W. Hermance.....Haverstraw, N. Y.
D. S. Lyon.....Nyack, "
Chas. A. Frost.....Pawlet, "
Emory Smith.....Tivoli, "
H. M. Burt.....Katonah "
Geo. A. Cross.....Niagara Falls, N. Y.
F. H. Allen.....Utica, "
Alfred Griffith.....Baltimore, Md.
C. C. Yeakle..... " "
J. F. Coulborn.....Cambridge, "
Geo. C. Marks.....Lebanon, Pa.
J. B. Bloomer.....Raritan, N. J.
N. M. Desmon.....Somerville, N. J.
H. R. Brown.....Philadelphia, Pa.
J. T. Anderson..... " "
J. A. Kirby.....Washington, D. C.
J. L. Hendricks.....Sparked, N. Y.
Katie Hewett.....Council Bluffs, Io.
H. T. Holden.....Charles City, "
M. Browne.....Des Moines, Ia.
Geo. W. Naile.....Sioux City, "
Fred. Lithgow.....Chicago, Ill.
Geo. Shaw..... "
Fred. McMillan..... "
C. T. Day..... "
E. D. Bangs..... "
J. P. Mansfield..... "
Wm. Etler..... "
A. H. Babb..... "
D. B. Burnett.....Chicago, Ill.
E. O. Martin..... "
Miss M. E. Housley..... "
G. N. Wilkinson..... "
A. G. Haight.....Fort Scott, Ks.
Peter McCauley.....Kanzas City, Mo.
T. H. Dugan.....Lincoln, Neb.
Wm. Ernesthausen.....Topeka, Ks.
Horace W. Nichols.....St. Louis, Mo.
Frank A. Stumne..... "
Chas. E. Burroughs..... "
Wm. H. Carse..... "
T. J. Herbal..... "
John M. Cundiff..... "
Michael Holahan..... "
C. A. Weiss.....Divide, Col.
John Gay.....Georgetown, Col.
Edwin Peel.....Grand Island, Neb.
A. W. Brown.....Ogden, Utah.
G. C. Webster.....Omaha, Neb.
J. W. Unwin..... "
P. Kearney.....Salt Lake, Utah.
W. P. Baker..... " "
J. F. Fitzpatrick..... " "
Jesse Knight.....South Pass, Wy.
S. C. Kinsey.....Pioneer, Pa.
A. H. Keller.....Rimersburgh, Pa.
C. R. Stough.....Pittsburg, "
W. W. Wing.....Arenac, Mich.
T. C. Clark.....Canal Doore, O.
Geo. Robinson.....Duncan City, Mich.
Annie Wright.....East Tawns, "
Chas. H. Billings.....Fort Wayne, Ind
C. A. Brockman.....Painesville, O.
H. Morse.....Fort Gratiot, Mich.
A. Morrison.....Port Huron, "
C. D. Fisher.....Portsmouth, "
Geo. Karbach.....Buffalo, N. Y.
Geo. W. Jones.....Cleveland, O.
F. H. Avery..... " "
C. L. Sponenberg.....Detroit, Mich.
L. H. Ball.....Andersons, Ind.
S. B. Roberts.....Indianapolis, "
Maurice Doherty..... " "
I. C. Flood.....Columbus, O.
Phebe Walker.....Hanging Rock, O.
S. S. McCune.....Vincennes, Ind.
S. B. Lawrence.....Washington, O.
A. D. Babbitt,.....Cincinnati, O.
J. K. Goodwin..... "
F. G. Adams..... "
R. Humphreys..... "
L. A. Madison..... "
A. T. Plank..... "
E. M. True..... "
E. E. Williams.....Burgan, N. C.
W. W. Blackwell.....Kettrells, "
Jas. H. Barnes.....Lilesville, "
D. D. Millan.....Rockingham, N. C.
Geo. T. Rhodes.....Big Lick, Va.
C. G. Cox, Jr.....Lynchburg, Va.
R. W. A. Horace..... " "
Caleb Moncrief.....Fleming, Ga.
A. A. Burke.....Green Pond, S. C.
W. T. Stone.....Macon, Ga.
Ed. Ives.....Savannah, Ga.
M. H. Morris.....Birmingham, Ala.
Geo. W. Roland.....Columbus, Ga.
T. J. Bentley.....Letohatchie, Ala.
J. M. Hamlin.....Cooper, "
A. A. Smith.....Cunninghams, "
F. M. Joslin.....Elmore, "
N. S. Brown.....Gilmers, "
L. H. Clawson.....Lomax, "
John C. Stewarts.....Wilhites, "
Chas. Galvarie.....Byram, Miss.
Henry Surgi.....Kenner, La.
Wm. A. Bowen.....Cold Water, Miss.
F. H. Campbell.....Guthrie, Ky.
W. Sadler.....Oakland, Miss.
M. L. Mynath.....Memphis, Tenn.
F. W. Birchett.....Artesia, Miss.
Wm. C. Phair.....Kenton, Tenn.
W. D. Manor.....Muldon, Miss.
N. S. Carr.....Saltillo, "
J. R. Higgins.....Shubuta, Miss.
W. B. Richardson.....Trepelo, "
W. D. Evans.....Middleton, Tenn.
C. E. Taylor.....Frankfort, Ky.
H. B. Spencer.....Nashville, Tenn.
Alex. K. Marshall.....Marshall, Ky.
John L. Morris.....Argenta, Ark.
Lucien Harris.....Madison, "
E. B. Vosburgh.....Monroe, La.
H. St. E. Austin.....Shrevesport, La.
W. P. Vinson.....Girard, "
M. S. Bacon.....Galveston, Texas.
J. R. Russell.....Liberty, "
T. J. Baldwin.....Trinity, "
R. J. Love.....Phelps, "
W. H. Wilson.....Jacksonville, "
Geo. Osborn.....Neches, "
R. A. Lacy.....Rice, "
T. W. Parkes.....Spring, "
W. W. Wall.....Mississippi City, La.
C. Doherty.....Rigolets, "
V. P. Morr.....St. Elmo, "
C.....Vermillion, "
E. Whiting.....Napa Junction, Cal.
W. H. Pyburn.....Monterey, "
J. E. Brady.....Mayfield, "
Miss A. Banks.....Unionville, Nev.
W. T. Stephens.....Shedds, Oregon.
S. M. Stephens.....Auburn, Cal.
—— Burdick.....Reno, Nev.
J. P. Fish.....St. Joseph, Oregon.
J. Loewenberg.....Wells, Mo.

RESIGNATIONS.

C. H. Thomas.....145 Broadway, N. Y.
Fannie Crawford..... " "
Clara A. Moore..... " "
A. J. Hatch.....Broadway and 34th st., N. Y.
W. J. Tubbs.....Castle Garden, N. Y.
E. A. Ward.....Duane st., "
W. A. Redfield.....Station H, "
C. Van Blaschoten.....Washington Market, N Y.
Mary G. Phillips.....Quarantine, S. I.
Mary Robbins.....Barrington, N. S.
S. E. Barton.....Plaister Cove, C. B.
F. A. McKenzie.....Wolfville, N. S.
A. Melick.....Sussex, N. B.
G. E Estabrook.....Camden, Me.
H. F. Dowst.....Clinton, Me.
H. Center.....Gloucester, Mass.
C. H. Snow.....Portsmouth, N. H.
L. H. Royce.....Charlestown, "
Geo. R. Penn.....Concord, "
L. H. Eastman.....Conway, "
F. C. Fowle.....Hooksett, "
Jenny L. Granville.....Highgate Springs, Vt.
E. A. Harris.....Bridgeport, Conn.
J. F. Sinclair.....Boston, Mass.
G. D. Mills..... " "
B. F. Stratton..... " "
E. J. Fullum.....Duxbury, Mass.
E. D. Fowler.....Fair Haven, Conn.
W. S. Gardiner.....Groton, "
W. H. Rathbone.....Montville, "
A. E. Rogers.....New Haven, "
W. H. Munro.....Providence, R. I.
J. H. Jordan..... " "
C. H. Robinson.....Pittsfield, Mass.
Miss F. A. Foster.....Westfield, "
W. H. Booth.....Waterbury, Conn.
H. J. McCormick.....Albany, N. Y
Peter Morley..... "
J. M. Purdy.....Haverstraw, N. Y.
Jennie M. Christie.....Nyack, "
S. Johnson.....Pawlet, "
N. J. VanDusen.....Katonah, "
John V. O'Neill.....Niagara Falls, "
Jas. W. English..... " "
W. J. Guilford.....Rochester, "
Wm. H. Boggs.....Baltimore, Md.
Edward Radigan..... "
T. G. Adams..... "
J. L. Wickenham.....Coatesville, Pa.

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J. W. Carver.....Somerville, N. J.
D. F. Brown.....Washington, D. C.
W. H. Kelsey.....Charles City, Ia.
T. L. Wilson.....Des Moines, "
D. H. Ogden.....Sioux City, "
Mrs. A. L. Nichols.....Chicago, Ill.
E. Ernsthausen..... "
W. G. Wilkie..... "
Chas. H. Mixer..... "
R. C. Rankin..... "
R. C. Minor..... "
John C. Tallman.....Kansas City, Mo.
D. D. Kennedy.....Topeka, Ks.
Jas. W. Cooke.....St. Louis, Mo.
M. D. Hamlin.....Divide, Col.
R. S. Fowler.....Evanston, Wy.
G W. Bloomfield.....Georgetown, Col.
W. H. Spofford.....Grand Island, Neb.
Geo. T. Brown.....Ogden, Utah.
L. W. Bradley.....Omaha, Neb.
G. W. Naile..... "
H. C. Marks.....Salt Lake, Utah.
E. L. Pearson..... " "
M. Croxall..... " "
D. B. Libby.....Bryan, Wy.
W. D. Snyder.....Rimersburg, Pa.
R. C. Fulton.....Pittsburg, "
H. M. Burritt..... " "
W. J. McElroy..... " "
Daniel Dixon.....Canal Dover, O
A. N. Rousch, Jr.....East Tawas, Mich.
F. S. Shurick.....Fort Wayne, Ind.
B. Chesney.....Painesville, O.
R. L. Myrick.....Port Huron, Mich.
B. Fisher, Jr.....Portsmouth, "
E. Schermerhorn.....Indianapolis, Ind.
Wm. Fellows..... " "
C. F. Webb.....Cincinnati, O.
E. Blaney..... " "
W. B. Waldron.....Hot Springs, Va.
W. H. Stringfellow.....Healing Springs, Va.
H. S. Snell.....Warm Springs, "
J. A. Burgess.....Old Sweet Spring, "
W. T. Crutchfield.....Rockbridge Bath Spgs, Va.
H. F. Lincs.....Sweet Chalybeate "
G. W. Walker.....Jordan R. Alum "
Cammack.....Rockbridge Alum "
John E. Irwin.....Blacks and Whites, Va.
T. C. Rush.....Berzelia, Ga.
G. W. Bell.....Charleston, S. C.
P. R. Sledge.....Covington, Ga.
A. B. Coburn.....Green Pond, S. C.
J. H. Duncan.....Cartersville, Ga.
M. H. Morris.....Byram, Miss.
R. E. Harris.....Cold Water, Miss.
C. A. Clarke.....Guthrie, Ky.
W. A. Bowen.....Oakland, Miss.
F. R. Simmons.....Memphis, Tenn.
N. J. T. Russell.....Artesia, Miss.
S. R. Perryman.....Shubuta, Miss.
E. Lowe.....Troy, Tenn.
L. W. Garner.....Trepelo, Miss.
F. W. Montgomery.....Frankfort, Ky.
G. B. McCoy.....Louisville, "
Harvey Pride.....Nashville, Tenn.
W. A. Kennon.....Liberty, Texas.
J. W. Wickard.....San Antonio, Texas.
Wm. Brittain..... " "
C. E. Dalley.....Trinity, "
T. W. Parks.....Phelps, "
R. F. Hergsin.....Mississippi City, La.
J. K. Henly.....Rigolets, "
J. S. Brainard.....St. Elmo, "
G. W. Selman.....Vermillion, "
D. T. Berry (died Oct. 6).....New Orleans, "
A. Gonzales.....Monterey, Cal.
Miss Eliza McGeorge.....San Rafael, "
J. M. Spencer.....Mayfield, "
Dr. Luther.....Unionville, Nev.
C. A. Wheeler.....Shedds, Oregon.
F. E. Mank.....South San Juan, Cal.

TRANSFERS.

	From.	To.
J. Mitchel	Long Branch, N. J.	Canal St., N. Y. City.
Mary L. Graff	Manor, L. I.	145 Broadway, "
E. M. Fink	145 Broadway	184 Pearl St., "
G. A. Kraft	Trinity Building	145 Broadway, "
H. McGonigel	Fulton Market	" "
G. Irving	Relief Service	" "
Maud Harris	Worth St. & B'way	" "
Irene Watkins	184 Pearl St.	Newark, N. J.
W. D. Schram	21 Wall St	145 Broadway, N. Y.
Jas. Doig	St. Nicholas Hotel	42d St., N. Y.
Alice A. Sponagle	Lunenburg, N. S.	Barrington, N. S.
Jas. Rannie	Plaister Cove, C. B.	Sackville, N. B.
Alice E. Wheeler	Amherst, Mass	Westfield, Mass.
Mary O. Harlow	Canton, Mass	Groton, Conn.
J. B. Gaynor	Hartford, Conn.	Providence, R. I.
Wm. J. Smith	Tivoli, N. Y.	Albany, N. Y.
S. Lawrence	Catskill Mt. House.	Hudson, N. Y.
C. N. Speakman	Ashland, Pa.	Coatesville, Pa.
Thos. Tindle	Lebanon, Pa.	Pottsville, Pa.
Jas. Monroe	Pottsville, Pa.	Shamokin, Pa.
Peter Lee	Shamokin, Pa	Pottsville, Pa.
Chas. A. Miller	Yatesville, Pa.	Ashland, Pa.
E. O. Waite	Chicago, Ill.	Clinton, Ia.
B. F. Witmar	Camp Douglas, Wy.	Evanston, Wy.
J. P. Doody	Omaha, Neb.	New Orleans, La.
C. W. Gearhart	Salt Lake, Utah	Camp Douglass.
Geo. O. Smith	Titusville, Pa.	Parker's Landing, Pa.
Jas. L. Knuzelle	Parker's Landing, Pa.	Titusville, Pa.
O. M. Stone	Cleveland, O.	Chicago, Ill.
D. D. Millan	Burgaw, N. C.	Rockingham, N. C.
D. F. Brown	Washington, D. C.	Augusta, Ga.
J. S. Eaves	Philadelphia, Pa.	" "
M. S. Harris	Tebeanville, Ga.	Charleston, S. C.
E. P. Tebeau	Fleming, Ga	Americus, Ga.
R. S. Pope	Birmingham, Ala.	Cartersville, Ga
Wm. Rabb	Letohalchie, Ala.	Georgiana, Ga.
D. J. Storatt	Kenton, Tenn.	Troy, Tenn.
Wm. Brittain	Galveston, Tex.	San Antonio, Tex.
M. S. Bacon	New Orleans	Gaveston, Tex.
R. A. Myers	Philadelphia	New Orleans.
L. W. Bradley	Omaha, Neb.	"
T. J. Woolf	Charleston, S. C.	"
C. Dwyer	Stockton, Cal.	San Francisco, Cal.
Jno. Egan	Napa Junction, Cal.	Knights Landing, "
Thos. Allen	Sacramento, Cal.	Wavisville, Cal.
G. W. Bittenbender	Mission San Jose, Cal.	San Rafael, Cal.
J. L. Sears	Reno, Nev.	Hamilton, Nev.
W. E. Smith	San Francisco, Cal.	San Diego, Cal.
Villigas, Y. P.	San Luis Ranch, Cal.	So. San Juan, Cal.
P. Henry	Steamboat, Nev.	Washoe, Nev.

PRESENTATION TO MR. M. S. ROBERTS.

On Christmas morning, the clerks attached to the Book-keeping Department of the New York office of the Western Union Telegraph Company, presented their Manager, Mr. M. S. Roberts, with an elegant Buffet.

Mr. Roberts is deservedly popular and worthy of any token of esteem deemed proper by his friends. Having served many years in association with him, we can speak "by the card."

PRESENTATION TO MR. H. B. BERRY.

A few evenings since Mr. H. B. Berry, division operator of the Susquehanna Division of the Erie R. R. Telegraph at Elmira, N. Y., was surprised by a visitation at his house from a delegation of the employés of the division, and presented in due form with an elegant silver tea service, comprising nine pieces. The presentation was made by Mr. G. S. Shepard, of Addison, with a brief, appropriate and humorous speech, to which Mr. Berry appropriately responded. The salver bears the following inscription:

TELEGRAPHERS
OF THE
SUSQUEHANNA DIVISION
ERIE RAILWAY
TO
H. B. BERRY,
CHRISTMAS, 1872.

After the presentation the company was invited into the dining room, where was found two tables elegantly and bountifully provided, of which all present showed due appreciation.

PRESENTATION TO COLONEL JAMES COLEMAN.

The Memphis *Appeal*, of a late date, at the close of a highly eulogistical notice of Colonel James Coleman, late Superintendent of the Western Union Telegraph Company, contains the following:

"The appended letter was forwarded to us, having been addressed to the employees of the telegraphic offices of this department, recently subjected to the superintendency of Colonel Coleman:

"MEMPHIS, December 11, 1872.

"*To the Gentlemen Employees of the Western Union Telegraph Company, Memphis, Tenn.:*

"GENTLEMEN:—I have the honor and pleasure gratefully to acknowledge the receipt of an order, on Messrs. Murray & Ridgley for a fine suit of clothing, being designed as a substantial testimonial of your esteem, upon my retirement from the service of the company. After an intimate personal and official association with you of so many years, I confess to you, gentlemen, that my most tender sensibilities are aroused by this closing act of your confidence and friendship. Whether I have deserved such a tribute or not, it will ever be a source of pride and comfort to myself, that you have so adjudged, and that you have sealed your judgment by your generosity. I have to thank you, not only for this last act of your generosity, but for others preceding it, which have touched my heart and inspired me with a constant sense of the brotherhood which has been engendered by our intercourse, and which, be assured, gentlemen, shall ever be cherished by me while my heart beats responsive to the memory of your more than fraternal kindness.

"With great respect and affection, I am, gentlemen, your friend and brother,

"JAMES COLEMAN."

PRESENTATION TO SUPT. PLUMMER OF THE PACIFIC DIVISION.

On Thanksgiving Day, Dr. O. P. S. Plummer, Superintendent of the Third District of the Pacific Division, Western Union Telegraph Company, was presented by Mr. J. Waldo Thompson, chief operator, on behalf of the operators of his district, with a magnificent gold watch and chain, which had been made to order at San Francisco, especially for the occasion, at an expense of $250, and the name of every contributor engraved upon the chain.

In presenting the watch and chain Mr. Thompson addressed Dr. Plummer as follows:

"Dr. Plummer, I have the honor, as well as the gratification, on behalf of the operators of your district, of presenting you with this watch and chain, as a slight token of the regard and esteem we have for you. May our intercourse in the future be as pleasant as in the past, and when you recall the names hereon engraved, may you always remember we are all your friends."

To which the doctor made an appropriate reply.

The inscription upon inner case of the watch reads:

"To Dr. O. P. S. Plummer, Supt. W. U. Tel. Co., from the Operators of the 3d District, Pacific Division, Nov., 1872."

PRESENTATION TO MR. F. H. LAWRENCE

The operators attached to the Leavenworth, Lawrence & Galveston Railroad, recently manifested their appreciation of their Superintendent, Mr. F. H. Lawrence, by presenting him and his newly-married wife with a beautiful Silver Set, consisting of six pieces—a tea and a coffee urn, sugar bowl, cream pitcher, slop vase, and a hot water urn.

The local Press, in mentioning the above, speak on the highest terms of Mr. Lawrence.

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PRESENTATION TO MR. COLIN FOX.

On Christmas Eve, Mr. Colin Fox, Manager of the Western Union Telegraph Company's business in Michigan, was presented by many of the ladies and gentlemen employed by the company in this city, and at other places in Michigan, with a very handsome watch and chain and a service of silver. The persons engaged in the transaction assembled in Mr. Fox's private room in the Telegraph building while he was at tea, and upon his return he was astonished to find his sanctum full of uninvited guests, and with valuable gifts lying on the table. The presentation speech was made by Mr. Geo. D. Kellogg, who has charge of the Western Union office at Kalamazoo.

The watch is a gold American stem-winder, and with the heavy guard chain was gotten up expressly for this presentation. The outer part of the watch bears the monogram "C. F.," neatly engraved, and on the inside is the inscription "Presented to Colin Fox, by the Western Union Telegraph Employees of the Michigan District, Christmas, 1872." The tea set consists of 10 pieces exclusive of the tray, all of which are of satin finish, and are with one or two exceptions gold lined. The gifts are quite costly, and yet are only a fitting tribute to the worth of Mr. Fox as a man and as the manager for Michigan of the Western Union interest.—*Detroit Tribune.*

PRESENTATION TO MR. C. H. FOSTER.

Upon the return of Mr. C. H. Foster, Superintendent of the Indianapolis, Bloomington & Western Railway, from his wedding trip, he was joyfully surprised in receiving from the officers of that Railway, a handsome set of Chamber Furniture, valued at (pecuniarily considered) $200. This evidence of esteem on the part of his employers, must be very gratifying to Mr. Foster, inasmuch as having held his position but for a short time, it speaks well for his efficiency and other good qualities.

He was also the recipient of other valuable gifts on the occasion of his marriage; among them a deed for eighty acres of land, pieces of silverware, &c., &c.

INFORMATION WANTED.

Information is desired as to the whereabouts of Joe Stephenson, telegraph operator. He was at Sanperra, Ind., last June, at which time he was last heard from. His father, John Stephenson, resides at Urbana, Ill. Information may be sent to this office.

DEVELOPMENT OF TELEGRAPHS IN CANADA.

Our attention has been directed by some figures published in a daily journal to the extraordinary increase of telegraph lines in Canada. Such an extension is but a necessary corollary of the rapid increase in railway mileage that each year witnesses. The telegraphs have not only gone with the railways, but keep far in advance of them. That spirit of restless enterprise and unfaltering energy which have given us the Allan line of steamers, and which are characteristics of the principal founder of several important Canadian enterprises, Sir Hugh Allan, mark all the operations of the Montreal Company, of which he is President. Its lines have been pushed everywhere, even to the remotest villages and hamlets of the Dominion. The policy appears to be to anticipate the wants of the country and the demands of the people; to build lines into new districts, whether they offer an immediate prospect of profit or not, leaving the natural growth of business to justify and recoup the expenditure. While this is undoubtedly the policy of success, it is also the best possible thing for the interests of the country.

During the present year the lines of the Montreal Company have been increased by 1,500 miles of new posts, and nearly 4,000 miles of new wire. *Two hundred* new offices have been opened. By the end of this year the Company will have in use 10,300 miles of poles, 18,000 miles of wires and upwards of 1,000 offices. It will be seen, therefore, that this year shows an increase of 20 per cent.—a rate of progress that must be held to justify all the credit for enterprise that it is possible to give the management of this Company.

The new lines have extended up the Ottawa River, through the lumbering districts, 150 miles above that city, and nearly 100 miles north along the banks of the Gatineau River. The Eastern Townships, New Brunswick and the remotest points on the Gaspe coast have been connected by wires with the rest of the Dominion. Northward from Orillia through the Muskoka district, as far as Parry Sound, lines have been extended. From Lindsay they have been erected through Minden and Haliburton; and the extensive counties of Frontenac and Addington have been supplied with branches running to their very remotest settlements. Along the routes of the Canadian Air Line, the Canada Southern, the Hamilton & Lake Erie, the Wellington, Grey & Bruce, the Toronto & Nipissing, the Midland, the North Grey, the Toronto & Muskoka and the International railways, lines have been built wholly or in part.

Plans are already being formed for extension during the season of 1873 which promise to be quite as extensive as those of the season just closed.

No country in the world is better supplied with telegraphic facilities in proportion to the population than Canada. Although the inhabitants of the Dominion are dispersed over so wide an area, rendering them so much the more difficult to reach, yet it appears as a remarkable fact, according to the latest statistics of the English lines, that we have more than *double the number of telegraph stations than in England in proportion to population.* The free use of the telegraph lines by the newspaper press of Canada might be pointed to as a further evidence of the marked development of telegraphic enterprise amongst us. That Canadian journals are able to give as large an amount of telegraphic news as those of any country in the world, not only demonstrates the energy with which they are conducted, but implies the possession of superior facilities for obtaining news cheaply and expeditiously. We may add that the public need not be reminded in what a large measure they are indebted for telegraphic facilities to Mr. H. P. Dwight, the Superintendent of the Montreal Line. The extensions in Ontario are all conducted under his direction, and many a distant locality now blessed with a line of telegraph may attribute the fact to the quick perception of Mr. Dwight in anticipating their wants, and pointing out the necessity of meeting them without hesitancy or delay.—*Toronto Monetary Times.*

TELEGRAPHIC COMMUNICATION WITH THE MEXICAN CAPITAL.

Telegraphic communication with the City of Mexico, by way of Matamoros, has been re-established, and a telegram was received in New York on Tuesday, 17th ult., from the Associated Press of Mexico to the press of this country, through its organizations, offering congratulations on the event, and extending an invitation to American representatives to be present at the inauguration of the completed railroad between the City of Mexico and Vera Cruz, on the 1st of January.

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Cincinnati, Ohio.

Manifold books of superior quality for TRAIN ORDERS furnished on short notice.

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Agate and Steel points for manifold writing always on hand.

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Has discontinued the manufacture of Telegraph Instruments, and is now giving special attention to the manufacture of his

UNIVERSAL APPARATUS

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ELECTRIC MEASUREMENT,

Which consists of his Tangent Galvanometer and his Rheostat as they have been recently improved, which, taken separately or unitedly, constitute a means for correctly determining the resistance of all conductors of electricity; the resistance and insulation of telegraph wires; the location of breaks, faults, crosses, &c.; the relative specific resistance and conductivity of metals and other conducting materials; the resistance and electro motive force of batteries; as well as the strength, quantity, or electro-chemical equivalence of all currents of dynamic electricity. The capacities of all other instruments for similar purposes combined, are embraced in this one. Its measurements are accurate and absolute, and are easily read off in British Association units, without the necessity of arithmetical calculations. It packs in a case seven inches deep and nine inches diameter, with a handled strap, convenient for safe transportation. Considering the wide range of its capacity, it is cheaper than any other instruments.

Price of apparatus complete, is $200 to $230, according to style, &c. Price, Tangent Galvanometers, $40 to $60.

Descriptive pamphlets may be had on application.

He also pays special attention to the manufacture of his

CELEBRATED HELICES

WHICH ARE OF

Naked Copper Wire,

So wound that the convolutions are separated from each other by a regular and uniform space of the 1-300th of an inch, the layers separated by thin paper. In Helices of silk insulated wire, the space occupied by the silk is the 1-150th to the 1-300th of an inch; therefore a spool made of a given length and size of naked wire will be smaller and will contain many more convolutions around the core than one of silk insulated wire, and will make a proportionably stronger magnet, while the resistance will be the same.

These Helices are now offered for the use of manufacturers of Telegraphic and Electrical apparatus, and orders will be filled promptly and on reasonable terms.

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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 4. NEW YORK, JANUARY 15, 1873. WHOLE NO. 125.

STEARNS'S APPARATUS FOR MEASURING RESISTANCE OF TELEGRAPH WIRE.

The accompanying illustration represents an apparatus designed and employed by Mr. Joseph B. Stearns, for measuring the resistance of telegraph wire, at the manufactory. *a* and *a'* are ∧ shaped steel contact supports, over which the wire whose resistance is to be measured, is drawn by a winding drum. *l* and *l'* are weighted levers for keeping the wire in connection with the contact points. A, B, C, D, are the four sides of the Wheatstone Balance. G is a galvanometer, one terminal of which is attached to the junction *f* of the sides A, B, the other terminal being connected with a vernier sliding upon the graduated scale S, and carrying a rider for making contact between the bridge wire *b* and the sides C, D, of the balance. *k* and *k'* are wires connecting the contact pieces *a* and *a'* with the branch B of the balance. *i* and *i'* are wires connecting a standard resistance *r* with the branch A of the balance. E is a battery attached to the terminals T, T, of the balance.

The standard resistance *r*, is made equal to that of a definite length of the wire to be tested, say one tenth of an ohm, and is composed of wire of the same size and quality as that which is being tested, and is placed in the same room with and near the latter, that both may be equally affected by changes of temperature.

The measuring apparatus must necessarily be situated at some distance from the place where the wire is handled, to prevent the constantly changing masses of wire and the jar of the machinery from influencing the galvanometer.

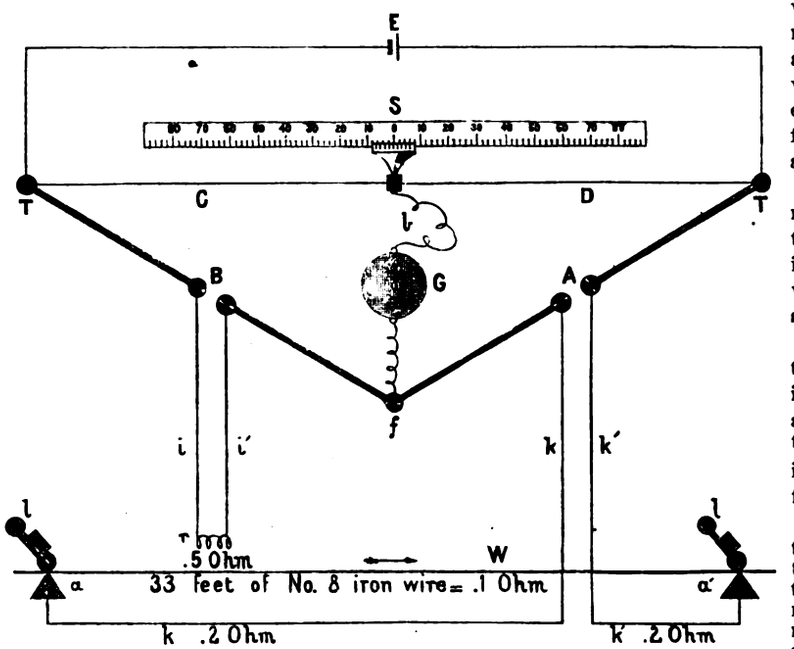
The two sets of leading wires *i i'* and *k k'*, are of the same size, length and quality, each set having a joint resistance of say four-tenths of an ohm, and are so placed as to be equally subjected to changes of temperature.

The total resistance in each side of the balance is thus made five-tenths of an ohm; and when the vernier is placed at zero of the scale and the battery circuit is closed, no current passes through the galvanometer.

Having given a general description of the apparatus, let us describe its practical operation. Suppose, for example, we desire to measure the resistance of a No. 8 iron wire, the maximum resistance of which must not exceed 16 ohms per mile. The contact points *a* and *a'* are for convenience placed at such a distance that the resistance of the section of wire between them shall be a definite unit, say one-tenth of an ohm. This, for the quality and size of wire above mentioned, would be precisely 33 feet. In other words, if the resistance of one mile, or 5,280 feet of wire equals 16 ohms, then the resistance of 33 feet of such wire would equal one-tenth of an ohm.

The end of the wire from a bundle to be tested, is now drawn from the reel through the contact points *a a'* and to the winding drum. While the workmen are attaching the end of the wire to the drum, the person in charge of the measuring instruments observes that the needle of his galvanometer does not stand at zero and he moves the vernier to the right or left, as the case may be, until the desired equilibrium is obtained. If the vernier has been moved five divisions to the right, and the whole scale is divided into six hundred equal parts, it will be manifest that the resistance of the tested wire is *less* than that of the standard, and a simple calculation will show how much less it is, thus 305 : 295 : : .1 : . 0967x10x16—15.47 ohms per mile; or, if the vernier has been moved one division to the left, then 299 : 301 : : . 1 : 10066x10x16—16.105, and shows that the wire has a resistance of 16.1 ohms per mile and is to be rejected.

The scale, instead of being divided arbitrarily, may with advantage be so divided as to show definite degrees of increase or decrease in the resistance of the tested wire; for example, one division of the scale may correspond with an increase or decrease of one-tenth of an ohm per mile in the tested wire, which was very nearly the case with the one used at the factory of Messrs. Farrar, Follett & Co. When the scale is thus adjusted, it is only necessary to observe the position of the vernier upon the scale to know exactly the resistance of the wire *per mile*.



By placing a delicate polarized relay in the bridge wire, and using a battery of somewhat greater strength, the apparatus may be made to automatically report to the person in charge of the wire room any defect or undue resistance of the tested wire by ringing a bell, or by tripping a magnetic escapement or detent to stop the winding drum, by shifting the belt, or otherwise. When so arranged, the services of an observer in the instrument room may be dispensed with.

Mr. Stearns measured at the factory of Messrs. Farrar, Follett & Co., at Boston, nearly one thousand miles of wire with the above described apparatus, with such minute accuracy that the variation of the thousanth part of an ohm was always detected.

During the early part of the testing about a dozen miles of wire was rejected as faulty, but it was afterwards discovered that this supposed fault was due to the fact that the wire was measured before it thoroughly cooled after passing through the galvanizing vats, and on again being measured every bundle, with the exception of a few containing imperfect joints was accepted.

In making these careful measurements, Mr. Stearns first made use of the Differential Galvanometer, but the indications proving untrustworthy, it was abandoned in favor of the Wheatstone Balance.

The contact points *a a'*, were at first two sets of rollers, but their resistance increased so rapidly, and was so variable, that they too were abandoned for the steel ridges, which gave entire satisfaction, and did not injure the surface of the wire.

It is almost unnecessary to observe, that great benefits would accrue to telegraph companies should they adopt this apparatus, and have all the wire manufactured for them, tested and measured at the factories by their own agents.

This close scrutiny and supervision of every foot of wire, would lead to greater carefulness on the part of the manufacturer, and would not only insure a wire of low and uniform resistance, but a good wire in other respects, for a low and uniform resistance implies a good quality of iron of uniform texture.

The one thousand miles of wire, before referred to, was tested under the direction of the Telegraph Company, and so great was the solicitude of the manufacturers that the wire should not exceed that stipulated in the contract, that they actually produced a better wire than had up to that time been known. The wire was a small number eight, weighing only 358 pounds per mile, yet much of it offered a resistance of less than twelve ohms per mile, and none of it measured as high as fourteen ohms per mile.

This excellent grade of wire, known as the "Union Brand," has since that time, and partially in consequence of these measurements being made known, acquired a deservedly high reputation.

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LIGHTNING AND LIGHTNING CONDUCTORS.

A Paper Read Before the Society of Telegraph Engineers, London.

The seventh ordinary general meeting was held on Wednesday, November 27, C. W. Siemens, Esq., F. R. S., President, in the chair; when, after the usual routine business, a paper was read "On Lightning and Lightning Conductors, by W. H. Preece, Esq., Member Inst. C.E., and S.T.E., &c.

The number and intensity of the thunderstorms which have raged over this country during the past season, as well as the accidents which have accompanied them, have been so far above the average that they have attracted unusual attention to lightning and the means at our disposal to protect ourselves, our buildings, and our apparatus from the destructive effects of electrical discharge. This, therefore, forms a most interesting subject for discussion before this society. Recently the partial destruction of that magnificent building, the Escurial, one of the chief glories of Spain, and called the eighth wonder of the world, has added considerably to the interest felt in the subject.*

In this country, not only have trees been shattered, cattle destroyed, public buildings struck, and private houses injured; but human beings have been killed in such numbers, that if tabulated, they would probably cast into the shade the massacre committed by even our railway trains. The average number of deaths due to lightning in England, previous to this year, was 18; in France it was 95.

Mr. Symons, the well-known meteorologist, who has for many years devoted much attention to this subject, mentions that in two storms in June last nearly two hundred separate accidents came under his own knowledge, including the death of ten persons and injury to thirty-three others; upwards of sixty houses were struck, ten or fifteen of which were burned down. Twenty-three horses and cattle and ninety-nine sheep were killed. This is the imperfect record of only two storms. What must it be for the whole year?

But it is the damage done to our telegraphic system that more immediately interests this society. I am able to give fairly complete returns of the injury inflicted on the apparatus and plant of the Postal Telegraph Department, and I am in hopes that the discussion which this paper is intended to inaugurate will elicit much important information of the damage done to our extensive Railway Telegraph System. The returns have been tabulated, and will accompany this paper as an appendix.

From January 1st to July 31st, 1872, of 9,475 instruments of different form in use in the department, 897 or 9·46 per cent. were injured. The different classes and number of apparatus used, and the amount of injury received by each, were as follows:

Instrument.	*Number in use.*	*Number damaged.*	*Per cent.*
Automatic	108	Nil.	
Hughes'	23	"	
Morse { Galvanometer	1943	87	3·24
Morse { Recorder	1943	7	3·24
Morse { Relays	1943	19	3·24
Single Needle	3536	364	10·29
Double Needle	77	2	2·6
Alphabetical	3303	374	11·32
Bells' (Bright's)	485	22	4·55
Protectors	....	73	
Total	9475	897	9·46

* The Escurial, since its completion, in 1584, has been on fire no less than seven times, viz., in 1587, 1590, 1671, 1744, 1766, 1796, and 1872. The causes of two of these are unknown; but at least four of the fires arose from lightning, yet there never has been one lightning-rod introduced in the Palace.

The actual or direct estimated cost of these injuries is £905, that is, £905 is the direct claim of the Postal Telegraph Department against *Jupiter tonans*, but it by no means represents the indirect claims of the department against that potentate. Thus it is impossible to estimate the loss of time on the part of the staff engaged in maintenance duties in visiting and revisiting stations damaged by lightning, or the effect of the delay in repairing the circuit upon the revenue, and the consequent detriment to the business. The total cost must be very large. If the damage inflicted upon our railway telegraphs and the delay to the traffic caused thereby were also estimated, it would be seen that our direct and indirect claims against Jove would bear a comparison with the historical Alabama Claims.

1—*Atmospheric Electricity.*

I do not propose in this paper to discuss the cause or nature of atmospheric electricity. It is sufficient for our purpose to admit the existence upon the surface of our earth and in our atmosphere of that great form of energy called *Electricity*. To study the effects of *Heat* it is not necessary to discuss its nature, and the great laws of *Gravity* have been determined without reference to the inscrutable mystery of its causation. I, however, do not hesitate to assert it, not only as an opinion, but as a fact well substantiated by experience and by reasoning, fathered by the greatest lights of our science, and taught by our leading philosophers, that electricity is no more matter than is heat, or light, or sound. Modern physicists know no such thing as the so-called electric fluid, *as a fluid;* that is, Electricity does not exist as a mass occupying space, and moving from point to point in such a way as to justify the assertion so often made that "it enters here and makes its exit there." It is one form of energy, and therefore necessarily *force* and not *matter*, displaying its effects in various useful, beautiful, and terrible ways. While the earthly theorists have imparted into our language terms based upon the hypothesis of a fluid—notably "current"—there is no objection to the continuance of these terms provided they do not convey to the mind erroneous ideas as to the nature of the force whose effects they symbolise. A current of electricity is a clear, well-defined term, raising in the mind at once an idea of its character; but it by no means implies the transference of matter from one point to another.

Thunderstorms are but gigantic repetitions of simple experiments. They are but elementary electrical phenomena, differing only in degree from those which cause the ordinary snapping spark from the machine, or the loud report from the Leyden jar. Electrical discharge, whether indicated by a *current*, by the *brush*, by a *star* or *glow*, or by a *spark*, depends simply upon the existence of two points at different potentials, separated in the first case by a conductor, in the latter cases by a non-conductor. In the case of the conductor, we have the ordinary electric current, and in the case of the non-conductor when the difference of potential is high enough, we have the disruptive discharge, accompanied with its usual explosive and luminous results. In any case of electrical discharge, either that indicated by a spark from a lump of sugar, by a disruptive discharge of a Leyden jar, or by a flash of lightning, there must be two conducting masses in opposite electrical states, separated by a non-conductor or dielectric.

These masses may be two thunder clouds, or the earth and a thunder cloud, oppositely electrified, separated by the air, forming the simple conditions of an ordinary condenser.

The discharge, whether from a Leyden's battery, or from Heaven's Artillery, must be instantaneous, and continuous along its whole path. The light we see is the effect of the discharge. It is indeed, as its color and as the spectroscope has shown us, simply incandescent matter. It indicates the path of the discharge and nothing more. When lightning is seen the danger is past. Persons who have been killed by lightning can have seen nothing of it. Their death must have been instantaneous. The placid state of their features is an indication of its painlessness. Persons who have been struck have stated that they have seen nothing and only felt a blow.*

The magnitude of the discharge depends upon the quantity of electricity present, and the distance through which it occurs. The path is prepared beforehand by induction. The particles of air or other matter in its path are raised to such a high state of polarization, that they are in a state of "tottering equilibrium," and the slightest acquisition of potential or diminution of resistance, either by approach of the conductor or increase of quantity, destroys this condition, and we have discharge with all the effects of light, heat, and mechanical energy. A ship sailing calmly over the ocean, a moving railway train, a horseman galloping home for shelter from the approaching storm may prove the last straw to break this camel's back.

The air which we breathe is invariably found all over the surface of the earth to be in a state of electrification. It is usually positive in fair weather, except a thin stratum in contact with the earth. Its potential increases as we ascend; but even at the same place, its potential and character vary at times, particularly when thunder is heard in the distance.

It is usually assumed that the great masses of clouds, called thunder clouds, are themselves the generators or sources of those great charges of electricity which result in thunder and lightning. It is, however, very doubtful whether this be so; but it is more probable that the clouds merely act the part of the coatings of a Leyden jar to accumulate and concentrate the charge in points. Clouds have even been known to be absent when a discharge of lightning has been evident; and discharges have frequently been observed to be repeated from the same cloud. Moreover, a very simple and well-known experiment shows that the charge of a Leyden jar exists—not in its coating—but in the dielectric which separates its coatings. In the same way a charge which terminates in a thunder clap exists in the air and not in the cloud.

There is a beautiful experiment of Franklin's, which illustrates the accumulative action of a cloud moving through polarized air.

1. Apply a charge to A and draw it gently to A^1. The charge will be found distributed.

2. Reverse the motion, the charge will again accumulate on A.

3. Charge the entire surface by a removeable coating, then draw A gently to A^1—discharge will take place two or three times during its motion.

A represents the cloud, B the earth, and C the air.

Thus, a moving cloud may merely act the part of a carrier or accumulator of the charge which exists in the air.

* Tyndall says:—"The nervous system requires a certain interval of time to become conscious of pain. The time of an electric discharge, is but a small fraction of this interval; hence, as a sentient apparatus, the nervous system is destroyed before consciousness can set in. If this be true, and there are the strongest ground for believing it to be true, death from lightning must be painless." (Notes, p. 16.)

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Lightning is usually classified into *sheet*, *forked* and *ball* lightning. *Sheet* lightning is merely the reflection of forked lightning, or the electric discharge which has occurred somewhere out of the field of view. *Forked*, called also *zig-zag* or *chain* lightning, is the light produced by the disruptive discharge between cloud and cloud, or between cloud and earth. *Ball* lightning is of a very different character. Many of these so-called "balls," are undoubtedly optical illusions, and Faraday, himself, stated that they were incompatible with what we know of electric discharge. "There may be balls of fire," said he, "but they are not electrical." Yet the evidence of balls of blue fire rolling along the surface of the sea, and suddenly terminating in terrible electric discharges over ships; masses of fire rolling along the ground towards buildings, ending in fatal discharge, and many other cases, leave it unquestionable that some such phenomenon as globular or ball lightning exists. Some have explained them to be balls of incandescent gas, rendered so by the discharge; but Mr. Cromwell Varley has recently offered a more acceptable explanation. According to him, ball lightning is a luminous spot on the earth, terminating a current or brush discharge from a negatively charged cloud. This spot moves with the cloud. Illuminated lines of force are projected from some point in the cloud upon the earth. He has been very successful in repeating the effect experimentally, and he suggests this fact as an explanation of the photographic images imprinted on the skin of persons struck by lightning.*

I quote from memory: "When after a serene sky, thunder clouds form in the distance, the observer sees the clouds and the illumination of the lightning displayed before him as a magnificent picture; and what he often takes to be forked lightning (*i. e.*, the actual flash, and not the reflection of it), appears to run through the clouds in the most beautiful manner." "That which is thought to be the electric discharge, is only the illuminated edge of a cloud, beyond and behind which the real discharge occurs. It is in its nature like the bright enlightened edge which a dark well-defined cloud often presents when between the sun and the observer, and even the moon also frequently produces similar appearances. In the case of its production by lightning and distant clouds, the line is so bright by comparison with the previous state of the clouds and sky, so sudden and brief in its existence, so perfectly defined, and of such a form as to lead everyone, at the first moment, to think it is the lightning itself which appears." . . . Hence many of the errors made as to the character, shape, and condition of the lightning flash.†

The discharge of a Leyden jar, of an induction coil, or that which is succeeded by lightning and thunder, invariably occurs along the line of least resistance. It has been found, in every accident which has been investigated, to follow the ordinary laws of the transmission of electricity, laws which are simple and thoroughly well known. This line of least resistance may be made up of metals, of bricks and mortar, of trees, or of animal flesh. Whatever in fact offers the least resistance will be the chosen path. It need not, necessarily, be a single track, for both in experiment with machines and with induction coils, as well as in the observation of the great experiments of nature, it is frequently found that the path is bifurcated, and often divided into three or even four lines. Thus the electric discharge in the air is a simple case of the electric discharge between two electrified conductors which have acquired such a difference of potential as to break through the resistance of the dielectric which separates them, violently displacing its particles, and completely altering its physical features.

There is nothing hidden, mysterious, or unknown in the laws of atmospheric electricity. They are simple cases of the ordinary well-known laws which are as "familiar in our mouths as household words."

II.—*Its Effects.*

The effects of atmospheric electricity are perhaps better known than those of any other natural phenomenon. They have been principally studied in their destructive results upon ships, upon buildings, upon human beings, and—in our own particular sphere—upon the instruments employed for telegraphic purposes. The case of a ship is very different from that of a building, or an apparatus within a building. A ship is a prominent object—generally a conductor—situated upon a plane—the sea. It thus, if a thunder cloud passes near it, at once reduces the line of resistance between the sea (the inner coating) and the cloud (the exterior coating) of the condenser, determining discharge. Hence it is that, so often it has been observed that a heavy black cloud is approaching the ship; and, without any previous warning whatever, a great flash of lightning or an apparent ball of fire has seemingly descended upon the ship, followed at once by an awful clap of thunder. On the other hand, buildings irregular form but an insignificant feature in the large area exposed to induction from a charged cloud. Trees and buildings take but a portion of the charges which in the case of ships have fallen in their whole intensity upon them. Except in the case of very prominent church spires, columns, &c., it is probable that the effects upon buildings are immeasurably smaller than ships. Again, in the case of human beings it is probable that but a small portion of the discharge passes through them; while in the case of telegraphic instruments the quantity of of electricity which passes through them is still smaller.

From these causes, the methods that have been adopted for protection based upon the damage inflicted on ships, have probably led to the adoption of unnecessarily costly and superfluous measures to protect buildings and instruments.

We, in this Society, are more interested in the effects of lightning upon instruments, and upon the apparatus constructed for the transmission of telegraphic despatches, though we neither ignore nor neglect its efforts in other fields.

The accidents that telegraphs suffer from might be divided into three classes:

1. Those affecting the wires;
2. Those affecting the poles; and
3. Those affecting the instruments.

Each of these classes may be sub-divided into those which are the result of the *direct discharge*, and those which are the result of *induction*. In the first case the wires, poles or instruments form a path or current for a portion of the discharge itself; in the second place they are influenced by currents which are induced by the approach, mersion, or sudden neutralisation of charged clouds.

1. (*a*) Direct Discharge.—The direct effects are not nearly so numerous as the induced. In the case of open wires, the discharge forms but rarely anything more than an instance of the passage of a very powerful and instantaneous current. Cases have occurred, however, where this current was so great as to fuse and destroy the line-wire; but such cases are very few and far between.

During the past season I can find but two cases where our line wires—viz.: No. 8 wires—have been absolutely fused.

(*b*.) Induction.—It is evident that the accumulation of a charge upon a cloud converts it into a very powerful inducing body. As the cloud approaches the line it induces in the section of the wire nearest to it an opposite electrical state, and as this change of state is gradual, a current of sensible duration must be observed; but when discharge takes place and the cloud suddenly loses its coercive power, the wire as suddenly recovers its neutral condition, producing a powerful current in the opposite direction. Hence, during a thunder-storm, wires are pervaded by repeated currents which ring bells, demagnetise needles, throw apparatus out of adjustment, shock clerks, and make false signals on railway block instruments. During the construction of the Hoosac Tunnel, two premature explosions of blasting charges were caused by these currents, producing serious and fatal results.

Not only the over-ground wires were affected, but those buried two feet deep under ground. I print as an appendix to this paper a very interesting correspondence which took place in the year 1854, between Faraday and Messrs. Latimer Clark, and Culley, upon the demagnetisation of needles upon the long underground circuits between London and Manchester, and very recently (July, 1871,) while some joints were being made upon the new underground wires between Manchester and Liverpool, the jointer was alarmed by a succession of crackling sparks passing from the wires to his box, which was in contact with the ground.

2. In the cases of poles, it has been found that when the pole has formed a portion of the path of the discharge, it has been, in the case of an unprotected pole, shivered to atoms, and one instance occurred where twenty successive poles were very nearly totally destroyed. Usually, however, a discharge which has taken the wire in its path, divides itself amongst several poles, and cuts out, with the smoothness of a gouge, spiral grooves from the top of the pole to the bottom.

3. In the case of instruments, the effects have been:

(*a*) From Direct Discharge.—Currents of such a strength as to absolutely burst out the cases, burn the woodwork, and fuse the wires of the galvanometers and electro-magnets. An exceptional case of accident has arisen from the wires passing close to gas pipes and the discharge passing across the air fusing the pipe, lighting the gas, and setting the station on fire. Such cases are, however, rare, and have generally occurred at "intermediate" stations where no earth was employed.

(*b*) Induction.—The induced currents being instantaneous and very strong, demagnetise or reverse the polarity of magnetic needles such as those of galvanometers. This was a very prolific source of trouble in former days, but we have recently introduced induced needles which have almost entirely removed the evil. The needle inside the coil deflected by the working current is not a permanent magnet, but a piece of soft iron temporarily magnetised by the influence of permanent magnets outside the coil; but even these external magnets are sometimes demagnetised.

* C. F. Varley, Trans. Royal Society, January, 1871,

† Faraday, vol. 2, p. 277.

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CORRESPONDENCE.

CONCENTRATION AND QUICKNESS.

To the Editor of the Journal of the Telegraph:

We carry within us an intuitive gauge of our own capabilities, and it is not often that any one strongly desires to attempt that for which nature has entirely unfitted him; it is seldom from constitutional incapacity that we fail to reach the heighths of our earnest aspirations; but because we do not know how to manage ourselves; to hold the will with a firm, true hand, and teach the wandering, restless brain to do its work to advantage and without undue waste.

Where there is a natural foundation to build upon, it is wonderful how rapidly a single faculty will grow, strengthen, and develop, when subject to regular, judicious exercise.

An operator wants every energy to center at once upon the work in hand; no floating of the thought upon a half-conscious day-dream, or curious notice of passing scene, to scatter and sap the nervous force; the foundation of quick and reliable thinking is concentration, and this is the first thing to be acquired. There are many ways of developing this faculty, and some excellent lessons in telegraphing are easily learned after the office doors have been closed behind us. The following hints may be useful: While in the street, glance at a house, giving it for a moment your whole attention; then turn away and try to remember how many windows are visible. Count in the same way a group of men or animals, or other objects which present themselves: or in passing a store, endeavor to take in the articles displayed; fix them and their arrangement in your mind, and the next time you go by, look if the impression was correct.

Forcing the attention and keeping it fixed right there, is also good practice. Here we can operate a little on Sunday, without fear of the sin of Sabbath-breaking. How pleasant in church, particularly if the sermon is prosy, to let the mind wander at will on a misty dream, or rest in some delightful remembrance; the monotonous tones of the minister's voice serving as a lullaby to your semi-conscious state of mental luxury! Rouse up! Do not for an instant listen to the siren imagination; rivet your attention upon the sermon, and keep it there; hear every word if possible, and weigh each thought. If you go home with a tired brain, and the headache, it shows how much the lesson was needed. After a few efforts of this kind, at church or lecture or whenever occasion offers, you will be surprised at the progress made in ability to keep the mind on a given subject.

The writer claims no originality in these ideas, or, indeed, in any that have been advanced; they were gained from others who know more than herself about intellectual culture. Their practical utility is obvious, and the student who avails him or herself of this mode of improvement, will find no end of opportunities occur for the development of quickness and concentration.

"I am, as God made me," is the weak and cowardly excuse we often make when our imperfections rise up in glaring distinctness. No, we are as we make ourselves. God builds the house, it is for us to fill and adorn it, each room with appropriate furniture. Let no appartments be found empty and covered with dust; hang on the walls pictures of bright and true thoughts and records of honorable deeds; sweep clean the hearth, and keep burning the fire of neighborly love and kindness; let the couches invite to repose, pillowed with the down of a quiet conscience; allow nothing unclean to mar the pure whiteness of the paneling; open the doors to heavenly visitants; and, above all, throw wide the windows for entrance of God's beautiful sun, bearing on golden rays the warmth of His everlasting love, and the light of His never-failing wisdom. A.

CLINTON, IOWA, Dec. 18.

To the Editor of the Journal of the Telegraph:

Your remarks on page 9, December 1st, of JOURNAL, leads me to suggest that in June or July next, the different agents of the Telegraphers' Mutual Life Insurance Association, together with the present officers of the association, meet in New York, with a view of inaugurating a system for carrying on the association which will reach into every section, and prove more satisfactory, if possible; and I would consider that the plan of the "Conductors' Life Insurance Association" would probably meet our wants better than any other I know of. Our representation, it seems to me, should be based upon *numbers* in large cities, and elsewhere by railroads. The expenses of the delegates would, of course, be paid by members making up the list represented.

All honor to the New York gentlemen who have thus far "run" the association, and now I hope the time has come when their burden can be lightened. All who are members seem to wish to have a voice in the management of the association.

E. O. WAIT, *Manager.*

In the JOURNAL of December 2, 1872, somebody is very much exercised about Rule 54. How do you reconcile Rule 54 with Rule 13. I have always been willing to furnish the desired information to my customers—but do it according to Rule 13. If these two Rules are in harmony with each other, please explain through the JOURNAL.—T. F.

Answer.—We do not see that the two rules conflict in any manner. Rule 13 provides a means whereby the sender of a message may be informed by the manager of the office where it is received, whether the message has been delivered to his correspondent or not. Rule 54, has reference to messages requiring answers from the parties to whom they are addressed, and provides that all such messages shall have the word answer plainly written upon the envelope, and that the messenger shall be instructed to make diligent efforts to obtain it. Should the messenger fail to get the answer, he must give the reason in writing to the delivery clerk, who will notify the office from which the message is received. *Messengers must in all cases be supplied with No. 2 blanks, upon which messages can be written.*

Will you have the kindness to answer me through The JOURNAL, the following question:

"A repeating station receives a message from another station to be repeated, with the check sent in this manner, 'D H, R R S.' but office where it terminates holds it for a check, looking to the repeating office for the check, and sends an office message to the repeating station that he is holding such a message for check from him. Should repeating office be looked to for check or the office where the message originated?"

Answer.—The repeating office should not have received the message without the number of words being stated in the check. It is not necessary to add R.R.S., the check, 10 D.H. is sufficient. The office receiving it from the repeating office should look to the latter for the proper check.

Will you please give through the columns of the JOURNAL the rule for counting messages like the following:

"Send thirty-five (35) dollars." Would the figures inserted after the number be counted, and if so, if there were more figures than words to represent the number, what is the rule?

Answer.—We have answered the above inquiry, in substance, in almost every issue of the JOURNAL during the past year. The rule is that when amounts or numbers are duplicated in figures, the figures shall be counted as containing the same number of words as the amounts which they represent when written out. For example, "Three hundred and fifty (350)" would be counted eight words—while "three hundred fifty (350)" would be counted six words. Ten thousand (10,000) would be counted four words.

M. H.—Both operators were wrong, and clearly showed more inclination to gratify their own tempers than to facilitate the business of the company. There is no possible excuse, under any circumstances, for any operator to fight for circuit. If the circuit is improperly taken by another office, it should be given up promptly, in order that valuable time should not be lost, and the conduct of the offending office should be immediately communicated to the Superintendant for his action in the premises.

Virginia.—We are very desirous that all employés of the company should be able to enjoy the blessed privilege of attending church, and there is no disposition on the part of any of the powers that be, to favor the employés of the company situated in one section of the country over another, in this, or any other respect. We cannot say whether the operators in the East need more of the influence of Divine teachings than those in the Southern States; but we take it for granted that there is no danger that any of them, in either section, will receive too much. We shall very cheerfully aid you in having uniform Sunday hours on all of the Divisions, and we hereby invite suggestions from the Superintendents in all sections in regard to the adoption of uniform Sunday hours.

Inexperience.—The instructions given in tariff-book should be followed for local rates.

Lazarus.—You should put a postage stamp upon such messages, and enter the expenditure in your account current, with an explanatory note.

Manager.—No half rate message can be sent for less than twenty-five cents.

All authorized transfer offices have been furnished with the necessary instructions for conducting the business Offices not so authorized have no right to receive moneys to be paid out at other places. If you have occasion to do such business, make application to your Superintendent to be made a money order office.

E. W. S.—Fitchburg should not have sent the words "141 Pembroke street, Boston, Mass.; send answer there," unless such words were paid for; and Ludlow should have insisted upon these words forming a part of the check when he received the message. Ludlow was not authorized to send the answer to Boston collect as the original message did not come from Boston.

R. B. H.—Many thanks for your efforts on behalf of the JOURNAL. Will send papers direct, as you suggest.

W. C. L.—Thank you. Poetry is hardly in our line. Put your ideas in prose.

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FOREIGN TELEGRAPHIC ITEMS

THE TELEGRAPH IN MEXICO.

The telegraph line has been completed between Mazatlan and Durango. The former city hopes to be in telegraphic communication with the capital at an early day. Another line is being constructed between Campache and Minatition.

A company of Mexican capitalists has been formed for the purpose of constructing a national telegraph line between the City of Mexico and the northern frontier, to follow the line of the proposed interoceanic railway, and pass through all the principal towns and cities.

THE ORKNEY AND SHETLAND CABLE.—The Scrabster correspondent of the *Scotsman* has ascertained that the defects in the Pentland Firth Cable are much greater than were at first supposed, and have necessitated the lifting of the entire cable from Caithness to Orkney, a distance of about fourteen miles. At various places the outer wire coating was found to be cut through, at others the twinings of the wire were unlaid, and the cable was otherwise much chafed. A month must elapse before the cable will be ready for re-laying, as wherever any defects appear it will have to be cut, tested, and spliced anew. From the very exposed route in which the cable was laid, it is doubtful whether it will remain workable for any great length of time in the position in which it has hitherto lain, the ground being composed of sharp rocks for the greater part of the way, especially at the Orkney side, and the current at spring tides in the Firth very strong, running at the rate of eleven knots an hour. To resist the friction arising from such a current would require a cable weighing about twenty tons to the mile, whereas the cable now about to be relaid weighs only about five tons to the mile. It is considered that if the route from Holborn Head, in Caithness, to Stromness, in Orkney, by Hoy Sound, were chosen, the current would not be felt nearly so much, and the ground, not being so rocky, would be better adapted for a cable route. As the Government now intend to take the management of it into their own hands, it is expected that in the future more satisfactory arrangements will be made.

THE directors of the British Indian Extension Telegraph Company have declared a further interim dividend of 6s. per share on account of the profits of the year ending 31st ult., payable on and after the 6th of January. In order to provide additional working capital for the business of the undertaking, the Telegraph Construction and Maintenance Company invited applications on Wednesday for an issue at par of £150,000 seven per cent. bonds, payable at the end of three years. The whole of these bonds were applied for in the course of the day, and the price closed at 1 to 2 premium.

IN 1867 there were in New Zealand 1,447 miles of wire, and the amount received for messages was £14,295. In 1870 there were 3,159 miles of wire, through which 181,860 private and 56,335 Government messages were sent, the total charge for which was £27,442. Since then the progress has been very considerable.

UNDER date of Kingston, January 9, 1873, we learn that the cable expedition will return to England on Monday, as the effort to recover the Aspinwall cable has been abandoned for the present.

SIR CHARLES BRIGHT had left for Santiago de Cuba.

POST OFFICE TELEGRAPHS.—The total number of messages forwarded from Postal Telegraph Stations in the United Kingdom during the week ending 7th December, 1872, and during the corresponding week of 1871. Week ending December 7, 1872, 285,646; week ended December 9, 1871, 229,383; increase in the week of 1872, on that of 1871, 56,263.

POST OFFICE TELEGRAPHS.—The total number of messages forwarded from Postal Telegraph Stations in the United Kingdom during the week ending the 14th December, 1872, and during the corresponding week of 1871, week ending 14th December, 1872, 291,117; week ending 16th December, 1871, 238,669; increase in the week of 1872, on that of 1871, 52,448.

THE Queensland authorities propose to devote £60,000 to telegraph extension purposes. The wire is to be manufactured in England.

THE New York, Newfoundland and London Telegraph Company have decided upon abandoning the greater portion of their land line, which terminates at Cape Ray, and on sending the whole of their messages through the submarine cable recently laid from Placentia *via* St. Pierre, to Sydney, in Cape Breton.

FURTHER steps have recently been taken for the complete amalgamation of the Anglo-American, the French Atlantic, and the Newfoundland Companies, touching which a recent prospectus recites the various rights and concessions of the companies, among which is the right to select, free of charge, 100 square miles of land in Newfoundland. The revenues of the Anglo-American Company amount to a payable rate of 12½ per cent.

A return made by the Treasury, in pursuance of the Telegraph Act, shows that the net produce of the work done by the Telegraph department in 1871, viz., £244,821, was applicable as follows: £233,081 to pay interest on the £8,238,757 consols, leaving £11,740 surplus balance to be applied as a sinking fund in reduction of the debt. But since the end of the year 1871 the debt has been reduced by the cancellation of £54,772 stock purchased with the £50,869 surplus balance of the year 1870.

AN extraordinary general meeting of the Eastern Telegraph Company (Limited), was held on Saturday last (the 7th inst.), when the chairman having observed that it was, he belived, the first general meeting of the amalgamated company, asked permission of the shareholders to give their sanction to the laying of a duplicate cable between England and Lisbon. Egypt, he observed, complained of the want of telegraphy, and they had about £14,000 of cables in store that could readily be laid between islands in the Levant. The cost of the England-Lisbon cable would be about £258,000. A suggestion was made that the company should first see whether the Government contemplated the purchase of the submarine cables; this, however, was overruled, and a resolution according the desired permission unanimously passed. The extra capital the company could raise, without further powers, was stated to be £403,000.

ON Monday afternoon, Dec. 9th, the Lord Mayor of London received the following communication through the direct Spanish cable just laid by the India Rubber Gutta Percha and Telegraph Works Company between Bilbao and the Lizard; "The Alcade of Bilbao, in the name of the Ayuntamiento, sends respectful greetings to Senor the Alcade of London, on the successful completion of the means of telegraphic communication between the two ports."

NOTICE is given by Mr. A. A. Martin, chief operator at Colon, of the Jamaica and Aspinwall cable, that during the interruption of the cable the agent at Panama, Mr. P. Mullarkey, manager of the Panama Railroad Company's Telegraph, will receive messages, and forward the same by steamer to the agent at Kingston, Jamaica.

THE Trans-Andine Telegraph has reached Jujui, thus placing the northern portion of the Argentine Republic in communication with Chili.

THE Government of Honduras is endeavoring to have established a telegraphic line between Honduras and Salvador.

In consequence of the success of the trials, made on the line of telegraph from Berlin to Dresden, of a new kind of metallic posts, which are found to be so much more stable and durable as to compensate largely, in maintainance, for the greater prime cost, the Government has it in contemplation to provide all the lines with metallic telegraph posts.

THE Eastern Telegraph Company announce that the average actual time in the transmission of messages from Bombay, during the month of November, was one hour and thirty-seven minutes, which, by comparison with the return for October, is an improvement in speed of twenty-two minutes. An improvement of 1¼ hours has also occurred in the average speed from China.

THE Government of Spain has signed a concession to a Spanish company for a telegraph cable from Cadiz to Cuba, by way of the Canaries and Teneriffe.

QUEEN Victoria has nominated Chas. Todd, Esq., Postmaster-General and Superintendent of Telegraphs for the Colony of South Australia, a member of the Third Class or Companions of the Order of St. Michael and St. George.

PUTTING LIGHTNING IN A BOTTLE.

It may be mentioned that in one of Franklin's letters, written apparently before the year 1750, the points of resemblance between lightning and the spark obtained by friction from an electrical apparatus, are distinctly stated. It is but thirty years ago that Andrew Crosse, the famous amateur electrician, was asked by an elderly gentleman, who came to witness his experiments with two enormous Leyden jars, charged by means of wires stretched for miles among the forest trees near Taunton:

"Mr. Crosse, don't you think it rather impious to bottle the lightning?"

"Let me answer your question by asking another," said Crosse, laughing. "Don't you think it might be considered rather impious to bottle the rain-water?"—*All the Year Round.*

MILDE'S MARINE WATCH.—A new and useful application of electricity has just been developed by MM. Mildé & Co., of 5, Rue Bizet, Paris, whose electric clocks, it will be remembered, formed a prominent and interesting series of exhibits in the French Annexe at the late International Exhibition at South Kensington. M. Ch. Mildé has designed an electric marine chronometer for ships, which will possess many advantages over the ordinary chronometers. This electric horary apparatus will require no winding up, and will be unaffected by variations of temperature or the shock or motion of the vessel, or any other causes of perturbation; and can be arranged to indicate, by simple means, the true time in all parts of the vessel.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
January 15, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular.

GENERAL INFORMATION.

Half Rate messages should not be sent to offices whose square number is greater than 508, (*except squares* 509, 510, 511 *and* 587). Attention is called to instructions on page 6 of the Tariff Book.

Bethel, Conn., is now a W. Union office, square 37.

Aroma, Ill., changed to Waldron.

Otterbien, Ind., closed.

Crawford, Iowa, changed to Dawville.

The towns of New Chicago and Tioga, Kansas, have been consolidated under the name of Chaunte, Ks. All business for those points should be checked with Chaunte.

West Newton, Mass., closed.

Holbrook, Mass., closed.

Plympton, Mass., re-opened.

The notice in JOURNAL of November 15, relating to business for Campell's, should read, Campello.

Cunningham, Mo., re-opened.

No more business for the following Other Line Offices will hereafter be sent *via* Olean, N. Y.:

Arcade, N. Y.	South Wales, N. Y.
East Aurora, N. Y.	Yorkshire Centre, N. Y.
Elma, N. Y.	Franklinville, N. Y.
Holland, N. Y.	Ischua, N. Y.
Protection, N. Y.	Machias, N. Y.

Abbottsburg, N. C., closed.

Ava. O., re-opened.

East Sandy and Milton Farm, Pa., should read 25 and 2 more than Oil City, Pa., ck. Oil City, Pa.

City Farm, Pa., closed.

Riverton, Pa., closed.

Yeders, Pa., closed.

No more business for the following Other Line Offices in Pa. will hereafter be sent *via* Olean, N. Y.:

Eldred.	Port Alleghany.
Larabees.	

NEW OFFICES.

398 Iroquois, Ill
308 St. Joseph, Ill.
397 White Heath, Ill.
398 Waldron, Ill.
381 Amo, Ind.
399 Evansville, Terre Haute and Chicago Junc., Ind.
454 Dawville, Iowa,
456 Cummins, Kansas.
* Cherry Valley, Mass...15 1 25 Worcester, Mass.
210 Otter Lake, Mich.
210 Otisville. Mich.
* Worthington, Minn...150 10 307 Chicago, Ill.
362 Torrance, Miss.
221 Arcadia, O.
170 Fairview, Harrison Co., O.
233 Fosters, O.
190 Laurence, O.

* Madeira, O.....	35	2	233	Cincinnati, O.
	55	4	213	Chillicothe, O.
	75	5	181	Marietta, O.
* Monroe Furnace, O..	75	5	233	Cincinnati, O.
	50	3	213	Chillicothe, O.
	65	4	181	Marietta, O.
	40	3	213	Portsmouth, O.
* Oak Hill, O.....	75	5	233	Cincinnati, O.
	50	3	213	Chillicothe, O.
	60	4	181	Marietta, O.
	40	3	213	Portsmouth, O.
* Raysville, O.....	65	4	233	Cincinnati, O.
	35	2	213	Chillicothe, O.
	60	4	181	Marietta, O.
* Sciotoville, O.....	55	4	233	Cincinnati, O.
	40	3	213	Chillicothe, O.
	65	4	181	Marietta, O.
	25	2	213	Portsmouth, O.
* Webster.	75	5	233	Cincinnati, O
	55	4	213	Chillicothe, O.
	65	4	181	Marietta, O.
	35	2	213	Portsmouth, O.

76 Smysers, Pa., P. O. A. is Seven Valley, Pa.
330 Carroll, Tenn.
510 Plano, Tex,
556 Fort Sanders, Wy.

OFFICES HAVING "SPECIAL SHEET A"

Will hereafter check West Troy, N. Y., same as "special rate to Troy, N. Y."

ATLANTIC CABLE BUSINESS.

We are officially notified that a new direct cable route is now open between England and Spain. Messages to go by this route must be addressed "*via* Bilbao," which words are not charged for beyond London. The rate from London is fixed at $2 for 20 words, half rate for every additional 10 or fraction of 10 words.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE, NEW YORK,
Jan. 14, 1873.

On and after January 27th, *Dunbar, Pa.*, will be added to the list of money order offices in C. O. Rowe's district.

G. H. MUMFORD, *Vice-Pres't.*

EFFECTS OF THE LATE SLEET STORM—GENERAL DISARRANGEMENT OF WIRES.

On Sunday morning, 5th inst., a severe rain with high winds reached here from the south about ten o'clock, and before noon all the wires and poles were heavily coated with ice. This storm lasted only a few hours, but the results, in the destruction of wires and poles, are without parallel in this section of country.

At 11.45 A.M., several of the Pittsburg wires failed; at 12.40 P.M., N. Y., lost Albany on every wire, except one on the Hudson River R. R. The Erie Railway wires, save one working between 145 Broadway and the Grand Opera House, stopped working at 1.00; all the southern wires were grounded or open by 1.30; and at 3.45 the last Eastern wire stopped working. The City Line wires had broken some time previously. Information arrived of the complete wrecking of the Fire Alarm and Police Telegraphs, and that the police were forbidding passage through the public parks, on account of several persons being injured by falling limbs from trees ice-coated.

By half-past three twenty-two men were examining lines in all directions, to ascertain damage; most of them remaining out on duty through Sunday night.

Teams and extra men were got ready for an early start, and at six o'clock, Monday morning, poles, &c., were being distributed on the West street lines, which were badly damaged—eighteen poles having gone in one place, besides numerous single ones.

On the east side of the city it was found that the large poles, each carrying fourteen wires, mostly southern and eastern circuits, were broken: five poles on the corner of 1st Avenue and 23d Street, two large corner-poles at the junction of 39th Street and 2nd Avenue, with a large number of intermediate breaks.

The Western wires on the 8th Avenue poles were badly smashed near 90th Street, and at corner 8th Avenue and 125th Street, the large poles at the junction were gone, and wires tied to lamp-posts and trees by police.

The Eastern wires, running from the cupola of 145 Broadway, across the house-tops to Fulton street, were broken by two large poles corner of Church and Fulton streets, breaking off near the ground and resting against the windows of adjoining houses.

The house-top wires on the City Lines suffered severely. The wind had twisted the ice-covered wires in all sorts of shapes. Cross-arms were dragged down, and the ends driven through tin and board sheeting, large iron rods supporting the short poles, were pulled up or bent out of shape, &c. Most of the wires lying flat on roofs when not broken. Complete re-building of the house-top lines has been necessitated.

Superintendent Hinchman and Foreman Mackintosh were indefatigable in their exertions, and soon brought order out of the seeming chaos. In this they were assisted by foremen Raymond of Worcester, Cates of Boston, and McColiff, of New Haven, who arrived early on Tuesday with gangs of men. Many operators, also, became temporary inspectors and repairers. Miss Phebe Williams, operator at the Cable House, at the foot of 55th Street, deserves especial credit for the intelligence she displayed in making changes of wires, &c., by direction of the chief operator.

By Thursday morning all the wires in the city, with the exception of a few on house-tops—the repair of which were delayed from local causes—were again in good shape. Thirty-two new poles and over twenty-five miles of wire were required in repairing damages, and more than twelve hundred breaks were mended between the Battery and Harlem.

On the Jersey side the effect of the storm was fully as destructive. Gen. Supt. Eckert was early on hand at this point, and re-construction went on energetically. All the available force of repairers, between Philadelphia and Jersey City, were ordered to the latter point. On Sunday afternoon a special engine carrying repairers and material left New Brunswick for the scene of disaster, and at 4 A.M., of Monday a special train came from Trenton. This train stopped at every point where a break had occurred. In this manner over one hundred breaks were repaired before 8 o'clock, at which hour the train arrived at Jersey City.

Between the Cable House and the Jersey City Office, 150 poles were broken, some of them in two pieces. The weight of the ice which had accumulated upon the wires, and the force of the gale, was sufficient to snap poles 45 feet long, 18 inches thick at the butt, and all over 8 inches thick at the top, set six feet deep in the ground, like a pipe stem. Singularly, not a cross-arm was broken, nor a pin drawn out, and only in a few places were the wires broken; altogether, 165 miles of wire had to be re-constructed on the Jersey flats. Supt. Bates was early in the field, and ably seconded the General-Superintendent. 115 men were engaged from Sunday afternoon until Friday night, working early and late, until at last the wires of the Company were again in complete order.

The services of Messrs. Barr and Ricker, Managers of the Elizabeth and the Newark Depot offices, respectively, were of much value, and the labors of foreman Cooke, of Jersey City, McAleer of Philadelphia, and Hilton and Brown of the Erie R. R. District, conributed greatly to the final result.

For the first day or two after the storm, business for the South had to be taken to the Jersey City office for transmission. Eighteen wires were worked to Philadelphia and Washington—two of them with the Duplex system.

Great praise is due to all engaged in these arduous duties The company have reason to be satisfied with the energy, zeal and good-will displayed, while the public have had another opportunity to observe the efficiency of the company's service.

THE Cincinnati *Gazette* hits the vitals of the postal telegraph scheme when it says, "that the whole pretense of making the mail service a benevolence to the poor, and taxing the shirts on their backs, to make up the deficiency, is a fraud." Not more than one tax payer in a hundred uses the telegraph more than two or three times a year, or has any occasion to use it oftener. Yet it is proposed to tax all these in order to furnish cheap telegraphing to brokers, produce dealers, newspapers, merchants. and bankers, who have not petitioned for a postal telegraph.

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TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

The acknowledgement of receipt of any assessment is to be understood as an acknowledgment for all previous assessments.

ASSESSMENTS, 34. 35, 36.

17 19 58 61 69 106 111 126 129 136 139 171 178 182
225 228 232 278 279 281 282 283 285 294 328
330 332 347 354 360 371 372 376 425 428 429
482 495 496 499 500 503 504 505 506 507 515
520 533 555 556 557 561 565 573 590 592 597
602 605 678 679 680 690 692 700 710 739 766
775 781 782 783 785 786 801 802 808 822 836
838 841 906 944 946 977 979 996 1014 1016 1041
1057 1063 1098 1099 1104 1109 1134 1135 1136 1141 1155
1156 1157 1158 1159 1160 1162 1185 1193 1194 1195 1211
1226 1227 1274 1275 1278 1279 1281 1283 1284 1285 1286
1319 1375 1378 1379 1380 1383 1395 1399 1405 1421 1430
1431 1432 1433 1439 1452 1464 1465 1466 1467 1468 1469
1470 1471 1474 1475 1476 1477 1482 1495 1496 1497 1509
1576 1584 1596 1599 1600 1601 1604 1005 1606 1607 1608
1609 1616 1617 1619 1632 1633 1638 1641 1642 1644 1655
1669 1673 1674 1675 1676.

ASSESSMENTS, 32, 33 & 34.
No. 495.

W. J. Holmes, Erie Railway Telegraph, New York, and W. J. Denver, Springfield, Mass., have been appointed Agents for the association in addition to those already named.

The treasurer has made a final settlement with the heirs of Andrew Ainsworth of Greencastle Ind., and Chas. E. Baker of Baltimore.

The former was in the employ of the Western Union Telegraph Co., and his family received the $100 paid by the company in addition to the proceeds of assessment No. 32, amounting in all to $1,070.60.

The heirs of the latter received $973,33 the proceeds of assessment 33.

We are pained to announce another death—that of Reuben S. Raymond for many years manager at New London, Conn. He died of Typhoid fever first ultimo after a lingering illness. Assessment notices covering his death will be issued in due time.

TERRIBLE EXPLOSION OF GAS IN THE CINCINNATI OFFICE. NARROW ESCAPE OF THE OPERATORS.

CINCINNATI, Ohio, Jan. 12, 1873.

At twenty minutes to eleven o'clock this evening a gas explosion occurred in the principal office of the Western Union Telegraph Company on Third street, in this city, heaving up the floor of the receiving room between the desks and windows, destroying the ceiling of the delivery room in the basement and blowing the plate glass windows in a thousand fragments. The panellings of the doors were torn out and portions of the cast iron mouldings forming the base of the column at the street door were hurled into the street, striking a messenger boy on the leg, but inflicting only slight injury. The windows in the bank opposite were badly cracked. About a dozen operators, at work on the fourth floor, rushed through the darkness to the street in safety, but subsequently returned to work. There were five persons in the room where the explosion occurred, and they fortunately escaped uninjured.

TREASURE TROVE.—The shares of the Nova Scotia Electric Telegraph Company had been for years of so uncertain a value that they were scarcely quotable. A gentleman some years ago gave away several shares to parties who wished to have a vote at the Board on a particular occasion, but did not feel disposed to pay more than a few shillings for the privilege. But since the sale to the Western Union stock has gone up, it is announced that the company are prepared to pay the stockholders $25 per share. This is an advance of twenty-five per cent. on the par value, and of as much as fifty per cent. on the cost of the shares to many of the present holders.—*Halifax Recorder, Jan.* 9.

ABOUT SUBMARINE CABLES.

Our readers are indebted to Mr. L. G. Tillotson, of the firm of L. G. Tillotson & Co., for the following extracts from a letter received by him from a friend in London. The general interest manifested in submarine cables at this day, serves to render the information contained in this communication of much value.

"Amongst the items of the greatest interest now agitating our telegraphic minds, the principal are the several Atlantic Cables and the communication with Australia by the new Overland line and also the completion of the West Indian Cables. As most of the negotiations and all the work in connection with the Atlantic Cable is being carried out on our side of the water, we may be naturally supposed to know a trifle more of the subject than is known on your side.

"The high price of Atlantic telegrams rendered sending messages quite a luxury, which was embraced by a very limited few, who in consequence of their business, used it largely; the general public sent a message only now and then, and then then did not like it, but they could not help it. However, the breakage of the two Atlantic and the supposed faultiness of the French Atlantic Cable, made people somewhat anxious about a total breakdown, so several schemes were at once on foot to lay what were termed *direct* cables, and to introduce a lower tariff.

"The first scheme was brought out privately by an eminent city firm, and the contract was immediately taken by the Telegraph Construction and Maintenance Company. However, the French Atlantic Company did not appear to admire this opposition, although strangely enough the scheme was offered to them in the first place to take up, and so after many *pros* and *cons*, arrangements were made by which they were to become the owners of the cable. A fresh issue of capital was the result, and the manufacture of the cable is steadily progressing.

"This cable will certainly be more direct than the three existing cables. It will start at a point near the Land's End, and from thence cross in as direct a line as possible to Halifax, from thence a cable will be laid to Long Island, and from Long Island to New York by cable and by underground line.

"The lengths will be

Land's End to Halifax, .	2896 nautical miles.
Halifax to New York, . .	720 " "
Total,	3616 nautical miles.

"Of this total, about 43 miles will be a well insulated underground line, about 3 miles on this side and the remainder on Long Island and to New York. The main stretch of cable is larger than any existing span, but it is hoped, that with the improvements in the manufacture, the speed of the cable will not be much less than that of the present French Atlantic, which is shorter by 300 nautical miles.

"The core is very heavy and equal in weight to the present French Atlantic, it consists of 400 lbs of seven wire copper strand insulated with 400 lbs of gutta-percha and compressed in four alternate coatings There is, however, a great difference in the gutta-percha used, in the existing cable the material is of the best kind usually employed in insulating sub-marine cables, possessing however, an inductive capacity of about 20 per cent. higher than india-rubber.

"In the present cable, the quantities as to weight are precisely the same as in the first French Atlantic Cable, but the use of the improved material at once reduces the capacity of the cable and will give an increased speed, taking the lengths as the same, but as the length will be now greater, this disadvantage will be equalized by the reduction in the inductive capacity.

This is undoubtedly a great step in advance in the construction of long submarine cables. The core for the slender section between Halifax and New York is 107 lbs. of copper and 140 lbs. of gutta percha.

As the varying depth of water necessitates a different type of cable, these are to be of the following lengths:

Shore-ends . . .	68 miles.
Intermediate . . .	853 "
Deep Sea . . .	2,652 "
Land lines . . .	43 "
	3,616 miles.

There is nothing particular to call attention to in these types of cable, except in the deep sea. This is of the usual Atlantic pattern, with an important addition. The sheathing consists of *ten* strands of wire and hemp, each strand being formed of a galvanized homogeneous iron wire, .099 inch diameter, to bear the breaking strain of 53 tons per square inch, and covered with five yarns of St. Petersburg or Manilla hemp; the cable thus sheathed, is protected with a light whipping of yarn sewed in the opposite direction, and then passed through a bath of silicated compound. In the original Atlantic cable the whipping was omitted.

The manufacture is progressing so rapidly that the contractors are looking out for something else to do. Over 2,000 miles of the various types have been made, and of this about 1,200 shipped on board the Great Eastern.

The other scheme, to which I referred, is that known as the Great Western; this was brought out independently. The proposed route of this cable is entirely new. The cable will start from a convenient point near the Land's End to the Island or Bermuda, and from thence to New York. From Bermuda, a cable will in the course of time be laid to St. Thomas, to connect with the network of the West Indian cable; subsequently it is proposed to lay another cable from Bermuda to the coast of South America, so as to embrace a still larger field of telegraphy.

The length required for this work is nearly 5,000 miles, the largest contract in Submarine Telegraphy yet undertaken. The length of the sections and the types of the cable are:

Section 1.—Land's End to Bermuda:

	Knots.	
Main Cable	2,990,	
Intermediate	210,	
Shore Ends	25,	
		3,225 knots.

Section 2—Bermuda to New York:

Main Cable.	642,	
Intermediate	40,	
Shore Ends	80,	
		762 knots.

Section 3.—Bermuda to St. Thomas:

Main Cable	931,	
Intermediate	15,	
Shore Ends	20,	
		966 knots.
		4,053 knots.

Whilst there is very little difference in the lengths of the short sections of the French and the Great Western Cable, there will be found in the main section of the latter an increased of 329 knots, which will make most material difference in the speed of working.

The insulation of this cable is materially different from the one just described, and also from the present existing Atlantic Cable. The conductor is insulated with that peculiar combination of India rubber, known as Hooper's Core. There have been many doubts about this material. It has been used largely, sometimes with unqualified success; at others with anything but success. There are plenty of advocates for it, and, probably, equally as many against it.

This cable will be the first *long deep* sea cable where this material has been used; and if the result is as successful as anticipated, gutta percha will have, at length, met its rival.

The core for the Great Western Cable consists of a stranded conductor *tinned* (copper and vulcanized rubber don't quite agree telegraphically, although chemically they have a close affection for each other), each wire is tinned, and the total weight per nautical mile amounts to 300 pounds, whilst the insulating material amounts to 250 pounds per mile. The insulating material consists of pure rubber next the *tinned* wire, then a separate next vulcanized rubber, and finally a jacket. The process is peculiar, but the result may be stated that it produces an insulator of the highest type; its difficulty is that in that length the insulation is so high that it can hardly be measured, and very special electrical tests have to be arranged to get any test at all. In fact, as an insulator, it is perfect and far too good. Fancy 3,500,000,000 ohms per mile at 75°!

In the external protection of the cable there is nothing which calls for any particular remark. The elasticity of the main deep sea cable is of a similar character to the duplicate French Atlantic. The manufacture of the cable is progressing satisfactorily, but the question of shipment being unsettled, no ships have as yet been engaged, although there is no talk of a big ship being needed; however, things, it may be supposed will settle themselves quietly in due course.

MARRIED.

HURLBUT—BABER.—In Skaneateles, N. Y., Dec. 31, 1872, by Rev. Dr. Hudson, O. W. Hurlbut, Manager W. U. Tel. office, Manchester, Iowa, to Miss Eliza Baber, of Skaneateles.

RHOADS—McGOWN.—At Urbana, Ohio, Jan. 1, 1873, at the residence of the bride's mother, James H. Rhoads, Manager W. U. Tel. office, Bellefontaine, O., to Miss Maria Mc Gown, daughter of the late John B. McGown.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, JANUARY 15, 1873.

ARTICLE THIRD ON THE POSTMASTER-GENERAL'S REPORT.

The following appeared as an editorial in the *Daily National Republican* of January 1, 1873 :

In the *Journal of Telegraph*, the official organ of the Western Union Telegraph Company, of the 15th instant, is a long criticism on the report of the Postmaster General, complaining of the gross inaccuracies into which he has been led. Among others, the Postmaster-General says the telegraph in this country collects an average of 70 cents on each message. The *Journal* makes the average 62 cents, an apparent error of 8 cents. It is very easy to show how these different results are obtained, and which party is guilty of inaccuracy.

Mr. Orton, the President of the Western Union Telegraph Company, gave the Postmaster-General some statistics of the business of that company for the year ending July 1, 1872. Among them, receipts for transmission of messages, $7,040,803.53 ; transmission of press reports, $979,083.71 ; transmission of market reports, $107,579.72 ; transmission of weather reports, $137,522.88 ; from all other sources, $192,705.93. Total, $8,457,095.77.

One other source is partly premium on gold from cable and other telegrams. There were sent paid messages, 10,271,935 ; D. H. messages, 660,203 ; Press messages, 1,512,561. Total of all kinds of messages, 12,444,499. Now, if our authority is correct —if the item relating to press messages is deducted from both sides of the account—there will remain 10,271,935 paid messages, for which there were collected $7,478,012.06, equal to an average of 72 8-10 cents per message, showing an underestimate on the part of the Postmaster General.

The official organ of the Western Union Telegraph Company obtains its estimates by deducting from "the receipts for the transmission of messages, $7,040,803.53," certain "disbursements," $220,395.75; leaving a balance of $6,820,407.78. Omitting all receipts for messages for weather and market reports, and adding to the paid messages, 10,271,935, the dead-head messages, 660,203 ; making a balance of 10,932,138 ; and thus obtains the result of 62 cents, *forcing* the average by deducting from the receipts and adding to the number of messages.

We submit that such criticism is hardly becoming a corporation to which are entrusted the secrets of its customers, and must greatly weaken the credibility of any other statements it may make.

In October last, the President of the Western Union Telegraph Company, at the request of the Postmaster-General, furnished the following statement of the operation of the company during the fiscal year ending June 30, 1872.

MESSAGES.

Number of paid messages sent during the year	10,271,935
Partially paid and free messages	660,203
Press messages	1,512,361
Total number of messages	12,444,499

RECEIPTS.

For transmission of messages	$7,040,803 53
For transmission of press reports	979,083 71
For transmission of market reports	107,579 72
For transmission of weather reports	137,522 88
From all other sources	192,105 93
Total receipts	$8,457,095 77

DISBURSEMENTS.

Paid other lines	$160,514 74
Refunded and uncollectable	59,881 01
Salaries	3,058,363 22
Messengers	293,908 30
Printing and Stationery	166,196 24
Rent, light and fuel	328,999 48
Office furniture, fixtures and repairing	116,345 62
Instruments and battery	240,991 02
Claims for damages and law expenses	41,530 68
Taxes	45,445 21
Repair and maintenance of lines	930,005 17
Rent of lines leased	150,082 42
Miscellaneous	74,600 05
	$5,666,863 16

It is probable that the receipts for press reports were slightly in excess of the amount stated, as the separation is made during the month by re-inspection of the messages, and some press messages may be overlooked.

The receipts for market reports are not paid by the press.

Those "from other sources," include premium on gold received from tolls accruing to the company on cable business, subsidies, commissions on money transfers, and dividends on stock held by the company.

The disbursement for messenger service is almost entirely for salaries, and the amount paid for repair and maintenance of lines, includes the salaries of the repairers.

In the above list of disbursements, are two items covering the amounts paid other lines, and refunded and uncollectible, amounting to $220,395.75, which amount is, of course, properly deductible from the receipts, thus leaving the actual receipts for the transmission of messages, exclusive of press and weather reports, $6,820,407.78. No estimate nor account was made of the number of weather report messages transmitted. The number of press messages, was stated in the letter to the Postmaster-General, as an estimate made by dividing the number of words sent for the press, by 30, which was taken as about the average number of words in ordinary commercial and social messages. The number of messages stated, does not include messages sent by or for railroad companies between stations on the line of the roads, nor service messages of the telegraph company.

Excluding from the account, both the estimated number of messages sent for the press and the receipts therefor, the account will stand thus : Number of messages sent, exclusive of press and weather reports, 10,932,138. Receipts for transmission of messages, $6,820,407, showing the average rate per message, 62 cents. If either class of these messages were included in the estimate, they would necessarily reduce the average rate received.

We have not imputed to the Postmaster-General any improper motives in the presentation to Congress of his inaccurate statements in relation to the telegraph, nor do we accuse the *Republican* of any disposition to intentionally misrepresent the facts in regard to the traffic of the Western Union Company. We presume that they are both honestly mistaken, and we shall take pleasure in setting them right. Our aim is simply to state accurately all the facts in the case, and if in so doing we are compelled to show gross errors in the statements of the Postmaster-General, or of his assistants and defenders, we do not thereby necessarily impeach their motives.

The method adopted by the *Republican* for increasing the average rate charged by the Western Union Company for the transmission of messages, is to deduct from the number of messages sent the 660,203 "partially paid and free messages," and to add to the receipts for the transmission of messages the revenue derived from market and weather reports, from refunded and uncollectible messages, from business taken in for other lines and paid over to them, from premiums on gold, dividends on stock owned by the company, and from other sources, and then divide these aggregate receipts by the diminished number of messages.

The only fault we can find with this method of arriving at a desired result is, *that it has no true basis in the essential element of fact.* The 660,203 partially paid and free messages were not all "dead-heads," as assumed in the *Republican's* calculations, *but were paid for at an average compensation, in cash, considerably greater than that derived by the company for the transmission of the Governmental weather reports.* The receipts for this class of messages were included in the receipts for the transmission of messages, so that there is no reason for excluding them from the number of messages sent in arriving at the average rate charged.

The propriety of excluding from the receipts for the transmission of messages the amount of charges on uncollectible and refunded messages, as well as the sum paid to other lines, it seems scarcely worth while to discuss, since the first amount never came into the treasury at all, and the last was only received by the company as agents for other lines, to whom it was paid over. We scarcely think that the *Republican* would include among its legitimate receipts the moneys paid to it as subscriptions for other papers for which it might act as agent.

The question whether the premium on gold, remaining in the company's hands after settling with the Cable Companies, should be regarded as forming a portion of the "receipts for the transmission of messages," might, perhaps, be open to discussion, but, as the amount would only make a difference of a fraction of a cent in the average rate, it is scarcely worth considering. The dividends on stock owned by the company cannot, however, in any way, be

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construed into receipts for the transmission of messages. The market reports were not counted as messages, but like the press reports, were counted out of the dividend as well as the divisor. If the market reports were counted as messages, they would greatly reduce the average rate, because the reports are delivered to a large number of subscribers, who pay for them a gross sum per week, irrespective of their number or length.

This brings us to the last item of misconception on the part of the *Republican*, namely, the weather reports. As we expressly stated that no account was made of the number of weather report messages sent, there does not appear to be any reason why the receipts for this business should have been included in the *Republican's* sum of receipts for the transmission of messages, to be divided by the number of messages sent for ascertaining the average rate of tolls. The $137,522.28 represents the gross sum paid by the Government for performing the weather report business from November 1, 1870, to June 30, 1872—a period of twenty months—and could not, therefore, form any part of the dividend for which the messages sent during the fiscal year ending June 30, 1872, made the divisor, for determining the average rate of tolls. We are very glad, however, to have our attention called to the weather reports, as it will afford us an opportunity to show the *extreme liberality* of the Postmaster-General toward the company in fixing the rate for this business, and because there can be no doubt about the average tolls received by the company for performing it.

From November 1, 1870, to January 1, 1872, the company received as compensation for the transmission of these weather reports, two cents per word for each circuit, irrespective of length, with no compensation for drops, office messages, or other services or special facilities. The circuits varied in length from 250 to 2,500 miles; that from Chicago to San Francisco being the longest. The weather reports consisted of three cipher messages from each signal station, sent daily at 7.45 A. M., 4.45 P. M., and 11.45 P. M., Washington time. The morning report contained 20 words, and the afternoon and midnight reports, 12 words each. The tolls were therefore 24 cents for the afternoon and midnight, and 40 cents for the morning reports. In a great many instances the offices from which the reports were sent, were not kept open for ordinary business after 9 o'clock P. M., and the operators were obliged to come to the office at midnight to send the weather reports. On the Pacific coast, owing to the difference in time, the operators were compelled to get up at 3 o'clock in the morning to send them.

The three daily reports from each station, contained an aggregate of 44 words, and at two cents per word for each circuit, amounted to 88 cents, or about 29 cents per report. The average length of each circuit, over which these weather report messages were sent, at an average rate of 29 cents, was 629 miles.*

*See statement of Chief Signal Officer, page 92, Report No. 99, House of Representatives, May, 9, 1872.

The 29 cents per message, however, covered a good deal more than the transmission of such message from 250 to 2,500 miles. This sum of 29 cents was not only to be taken by the company, in full payment for the transmission of such messages, but no additional allowance was to be made for drops, office messages, or other services or special facilities required by the chief signal officer.

Let us consider what the company performed for the signal office, besides sending the message, for which it could only receive 29 cents. Three times in every twenty-four hours, the following circuits had to be made up and placed at the disposal of the weather report business:

Circuit Limits.	*Distance in air line. Miles.*
Portland to New York,	339
Mount Washington to Boston,	200
Burlington to Boston,	234
Knoxville to Washington,	512
Lake City to New York,	1,123
Augusta to New Orleans,	674
Milwaukee to New York,	1,047
Detroit to Grand Haven,	189
Pittsburgh to Chicago,	468
New Orleans to Chicago,	913
Cairo to Chicago,	365
Leavenworth to Saint Louis,	312
Galveston to New Orleans,	306
San Francisco to Chicago,	2,349
Chicago to Keokuk,	245
New Orleans to Shreveport,	396
San Francisco to Portland, Oregon,	797
San Francisco to San Diego,	517
Cheyenne to Santa Fé,	543
Corinne to Fort Benton,	622

Now, the message had not only to be sent over one of the above circuits for 29 cents, but it had also to be dropped at every intermediate signal station without any additional compensation. Upon the New York and Lake City circuit, each message was required to be dropped at Cape May, Philadelphia, Baltimore, Washington, Norfolk, Wilmington, Charleston, Augusta, Savannah and Lake City—making ten copies of the reports which had to be written off and delivered by the company for 29 cents—or counting each copy as a message, about 3 cents per message. But this is not all that had to be done to earn the average toll of 29 cents.* The company was to provide all other services or special facilities required by the chief signal officer, without *additional allowance.*

In addition to the occupation of the above described important circuits, extending throughout the United States, for the transmission of the weather reports, the chief signal officer represented that it was necessary that he should have at his disposal special circuits between Washington and New York, Washington and Chicago, and Washington and New Orleans. These circuits were required to be connected with the Signal Office at 7.45 A. M., 4.45 P. M., and 11.45 P. M., daily, and at such other times as the signal officer should call for them.

* Since January 1, 1872, the Signal Service reports have consisted of three daily messages from each signal office, and the rates have been increased to three cents per word, making the average rate 30 cents per message.

The connection with the signal office was made by the construction of special lines by the Western Union Company, for which they received no *additional allowance.*

Under the claim of the right to send office messages, and to receive other services or special facilities from the company, without additional allowance, the signal office took possession of the special circuits for purposes of display, as well as for the obtaining of trivial information, such as the hours for the departure of trains, the hiring of operators, the procurement of vaccine matter for the prevention of small pox, etc., etc., during the most crowded hours of the day, when they were most useful to the public, and, therefore, most valuable to the company.

Probably the above statement, relating to the signal service business, will satisfy the *Republican* that we did not leave the signal service messages out of our exhibit, because the price paid for their transmission would have increased the average rate; but we fear that it may cause that journal to doubt the justness of the rate of compensation *allowed* by the Postmaster-General for their transmission, and which the President of the Western Union Company maintained and proved before the Committee on Appropriations was totally inadequate. Indeed, the fact that this preposterously low rate was accepted by the Company for performing the signal service business, was taken advantage of by Mr. Hubbard, in the recent report in favor of his job, presented by Mr. Palmer, of the Appropriation Committee, to prove that the Company's tolls were too high!

While the authority of the Postmaster-General to fix the telegraphic charges for Government messages, under the Act of 1866, was not denied, the Company did not admit the right of that officer to control its wires, to direct when and how circuits should be made up, to dictate the routes by which messages should be sent to their destination, to order its operators to open their offices at unusual and inconvenient hours in the morning, and to keep them open at night until the permission of some other Government official to close them had been obtained. Nor was it willing that the most important circuits in the country should be seized upon at any moment by the signal office for the gratification of a momentary whim, and notice was therefore given that the signal office's control of the wires of this Company would cease on the 30th of June, 1872. Since then, the weather report business has been mainly performed by other Companies, very much to the relief of the Western Union Company; and the views of the former, as to the Postmaster-General's rate of compensation, may be inferred from the testimony of Mr. Thurston, President of the Pacific and Atlantic Telegraph Company, before the Committee on Appropriations, December 17th, 1872.

The CHAIRMAN.—Has the question ever been raised in your company as to the right of the United States under the Act of 1866? Have you ever contested it with the Government or denied it in any way?

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Mr. THURSTON.—No, sir. We do not pretend to contest it or deny it under our acceptance of that Act.

The CHAIRMAN.—Have you ever refused to send any message for the Government?

Mr. THURSTON.—No, sir. *We have protested against the compensation, and my protest is now on file in the signal office, showing distinctly that we are doing the work at one half its cost to the company.* I propose at the proper time to make application to the proper authorities for recompense for the money that we have lost in doing the service for the Government. I stated the matter very fully in my protest on file in the signal office.

The CHAIRMAN.—When?

Mr. THURSTON.—Some time last Summer.

The CHAIRMAN.—Does the mode adopted by the signal office of sending its messages interfere with your business any more than any other ordinary form of messages?

Mr. THURSTON.—Yes.

The CHAIRMAN.—In what way?

MR. THURSTON.—We have certain hours at which signal messages are supposed to be handed us, at which time we are expected to transmit them without delay, giving them preference over all other business. Until those messages are handed in we cannot fully handle our wires, nor undertake to send long messages, because we would have to interrupt them when the signal messages come in. The result is that the wires lie comparatively idle, waiting for the signal messages. Of course there are a few messages sent in the meantime in regard to handling the wires, or such office business as is needed; but, effectually and practically, the wires are at the service of the United States for one hour's time. When that hour expires the orders are to go on with the regular business of the office; but during that hour's time the wires are kept virtually at the service of the signal office.

The CHAIRMAN.—Is the peculiar arrangement of circuits and dropping messages a matter of disadvantage to you?

Mr. THURSTON.—Yes, sir.

The CHAIRMAN—In what way?

Mr. THURSTON.—The circuits are purely arbitrary and are not circuits of the Company. The signal service makes our circuit for us from New Orleans to Cincinnati, whether our Superintendent makes it so or not, and we must send its messages over all the circuit; then the messages have to be dropped, and for these drops we get no compensation. For instance, we send a regular commercial message from Cincinnati to New Orleans, and we receive for it $1.50; the signal service sends its messages between the same points, and we receive for it only 30 cents—but that message is also dropped at Louisville, Nashville and Memphis. There are one, two, three, four messages delivered for 30 cents. But the signal service says: "No, this goes the whole length of the wire; it is "heard at each office as it passes through; it goes "through those offices anyway, and the dropping of "it is no extra expense to the company." If that message which goes from Cincinnati to New Orleans was sent primarily from Cincinnati to Louisville, it would be a message, and would be paid for at the rate of 30 cents; the manipulation in sending it from Cincinnati would be the same, and the labor of receiving it at Louisville would be precisely the same. But the signal service says that it is no trouble to have the message dropped at Louisville, and yet the operator has to be on hand there, and has to go through the same manipulations in receiving that dropped message as if it had been sent primarily, and only from Cincinnati to Louisville. The result is that a signal service message sent from Cincinnati to New Orleans employs four officers, and requires the same services to be performed as four commercial messages would require, and yet the signal service pays for only one message, and pays for that only 20 per cent. of that which a commercial message would pay.

THE CHAIRMAN.—The operators would be at the intermediate offices anyhow, would they not?

Mr. THURSTON.—They might not be. It is not likely that some of them would be at their offices at 12 o'clock at night. It would not be necessary.

Having thus presented the leading facts in the case in a fair and candid spirit, we trust that the *Republican* will, in justice to us, to its readers, and to itself, reproduce this article wholly or substantially.

WE take great pleasure in acknowledging the receipt of a letter from Superintendent Flanery, of New Orleans, enclosing check for subscriptions; and still more for the very complimentary manner in which he alludes to the great improvements in the JOURNAL, and especially to its notable feature, the illustrated electrical apparatus, which, he justly says, should make it invaluable to young and old. The arduous duties incident to the production of a paper containing accurate and valuable information upon all subjects pertaining to the great field of electrical science and practical telegraphy, are fully compensated by words of commendation spontaneously offered by men of such sterling ability and acquirements as Mr. Flanery.

ELECTRIC RAILROAD SIGNALS.

The advertisement of the Electric Railroad Signal Company, cautioning officers of railroads and others interested against infringers upon the Patents held by that company for Electric Railroad Signals, will be found of interest to the parties concerned.

THE new advertisement in this issue of the JOURNAL, of Messrs. Partrick, Bunnell & Co., is worthy of the attention of all telegraphic managers.

With greatly enlarged and perfected manufacturing facilities, they offer a most complete line of instruments and supplies, covering every possible requirement of telegraphic maintenance.

As these gentlemen are extensively known as being thoroughly practical telegraphers, there is good reason to believe that their telegraphic manufactures will be found fully up to the highest standard of excellence in every respect. Their friends, who are numerous throughout the United States, will be pleased to note their progress.

ANNUAL SUPPER OF THE CINCINNATI TELEGRAPHERS.

A very cordial and happy state of feeling between the Adams Express Company at Cincinnati and the telegraphers of that city has existed for a long time past. This pleasant feeling culminates yearly in a supper, at which the part of hosts are maintained by the Express men. Last month the supper came off on the 21st, all telegraphers who were fortunate enough to be off duty being in attendance. Invitations were printed in telegraphic characters, and the order of toasts, &c., appeared in a highly ornamental manner. The banquet hall at the St. Charles Hotel was handsomely decorated with evergreens and flags, and a fine band discoursed good music. At eight o'clock in the evening a procession was formed from the Western Union Telegraph office, and, headed by the committee, marched to the hotel. Mr. Weir, of the Express Company, presided. Speeches were made by Mr. Weir, Mr. Speed, Supt. of the Pacific and Atlantic line; Mr. Williams, Supt. of the Western Union Co.; Mr. Armstrong, Manager of the Western Union Co.; chief operators Johnson and Mattoon, Mr. Selden and others. Had we space we would gladly give our readers the speeches, more particularly those of Messrs. Mattoon and Selden, which were in a very happy vein and abounded in local allusions. The party broke up at a late hour.

NEW TELEGRAPH INSTRUMENTS.

The advertisement of F. L. POPE & Co., in our columns, will be of interest to managers of telegraph lines and others who desire to purchase telegraph instruments and supplies. This firm are now prepared to fill any orders that may be entrusted to them with promptness. Their new RELAYS, SOUNDERS and KEYS are newly designed by Mr. F. L. POPE, and scientifically adapted to the service required. They are very handsome instruments.

ANNUAL MEETING OF THE INTERNATIONAL OCEAN TELEGRAPH COMPANY.

The annual meeting of the International Ocean Telegraph Company was held at the office of the company in this city, on Friday, December 27th, and the following gentlemen elected directors of the company for the ensuing year:

Messrs. Henry K. Bull, M. L. Delafield, D. H. Haight, A. Hamilton, Jr., Charles Knapp, Robert L. Livingston, James T. Sandford, Wm. F. Smith, E. S. Sandford.

At a meeting of the new Board on the following day, Gen'l Wm. F. Smith was elected President; A. Hamilton, Jr., Vice-President; M. L. Delafield, Secretary; and Theo. P. Bladen, Treasurer.

GEO. A. GUSTIN, ESQ., for the past five years chief operator in the Augusta, Ga., office, of the Western Union Telegraph Company, has been appointed stenographer and private secretary to the Postmaster-General.

GEO. C. MAYNARD having resigned the position of Electrician, U. S. Signal Office, James A. Swift, for a long time Operator in the Western Union Washington Office, and for the past two years Operator at the Signal Office, has been appointed in his place.

THERE are, at present, three submarine telegraph cables between America and Europe. A new cable is soon to be laid by the French company, and still another by the Great Western Telegraph Company, making five in all. The total amount invested in all these cables will be thirty millions of dollars.

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RE-ORGANIZATION OF THE SOUTHERN DIVISION.

General Superintendent Jno. Van Horne has re-organized his Division, dividing it into seven Districts, and the changes have been approved by the President.

It will stand as follows:

1st District. { J. R. Dowell, Sup't, Richmond, Va.
J. W. Kates, Ass't Sup't, Richmond, Va.

2d District. { J. B. Tree, Sup't, Louisville, Ky.
Geo. W. Trabue, Ass't Sup't, Nashville, Tenn.

3d District—J. A. Brenner, Sup't, Augusta, Ga.

4th District—C. G. Meriwether, Sup't, Mobile, Ala.

5th District. { D. Flanery, Sup't. New Orleans, La.
James Compton, Ass't Sup't, Jackson, Miss.

6th District. { L. C. Baker, Sup't, Little Rock, Ark.
Wm. A. L'Hommedieu, Ass't Sup't, Monroe, La.

7th District—D. P. Shepherd, Sup't, Houston, Texas.

The Superintendents will have charge of all office accounts, make all reports to the Auditor, and all requisitions for funds.

The Assistant Superintendents will take charge of construction, reconstruction, ordinary repairs, circuits, electrical matters, and railway relations.

Foremen and local repairers will be under the control of and report to the Assistant Superintendents, and draw their pay from them.

The Assistant Suprrintendents will make no requisitions on the Treasurer for funds, but draw their money through the Superintendents of their respective Districts.

INSULATION TEST OF WIRES IN THE SEVENTH DISTRICT, CENTRAL DIVISION, MADE AT CINCINNATI, OHIO.

	Tested with.	*Miles.*	*Mileage Resistance in Ohms.*	*Gauge of Wire.*
A..	Columbus..	122	15.	No. 8, new wire galvanized.
B..	"	130	18.2	25 miles old No. 6, plain; remainder No. 9 galvanized.
C..	"	130	16.	No. 9 galvanized, in use 2 years.
D..	"	122	18.2	66 miles No. 9, galvanized; remainder No. 6 plain, very old.
E..	"	122	15.8	24 miles No. 8 galvanized; remainder No. 9 galvanized, nearly new.
D..	Pittsburg..	315	17.9	66 miles No. 9 galvanized; 56 miles No. 6 plain, very old; remainder No. 9 galvanized, nearly new.
E..	"	322	17.3	24 miles No. 8 galvanized; remainder No. 9 galvanized, nearly new.
F..	Grafton....	309	14.5	212 miles No. 8, remainder No. 9, all new galvanized.
G..	St. Louis..	341	16.2	No. 9 galvanized, in use 11 years.
H..	"	330	16.7	No. 9 galvanized, in use 12 years.
I...	Louisville..	140	16.9	12 miles No. 9 galvanized; remainder No. 8, all new.
J..	"	109	13.8	No. 8 galvanized, new.
K..	Chicago....	294	17.	Few miles No. 9, remainder No. 8, all new galvanized.
A..	Cleveland..	295	17.	122 miles No. 8, new; remainder No. 9. 143 miles of which is very old, all galvanized.

These tests were made in clear, cold weather, no escape.

GOOD WORK AT INDIANAPOLIS.

The President's message was received at the Indianapolis Ind., office, upon two wires, between the hours of 2.15 and 6.30 P. M. It contained over 11,300 words, and was taken without a break. The spokesman of Indianapolis office wants to know "can you get ahead of that." We cannot.

PRESENTATION TO MISS ANNIE RICHARDS.

A number of the citizens of Skaneateles, N. Y., on New Year's day, presented Miss Annie Richards, manager of the Western Union Telegraph Office, with an elegant camp chair. That present came from the right quarter. Miss Richards is to be congratulated upon her popularity with the customers of the company.

PRESENTATION TO MR. L. A. LOUIS.

Mr. L. A. Louis, Superintendent of the Telegraph for the I. C. R. R., was presented with a handsome gold headed cane on Christmas eve, by the Telegraph employees on that road. The local papers say that the caning he then received served him right. That is our opinion likewise.

PRESENTATION TO MR. S. L. GILSON.

Yesterday afternoon Mr. S. L. Gilson, Manager of the Western Union Telegraph Company, was made the recipient of a handsome testimonial from his operators and attaches of the company. At the hour of five P. M. Mr. Gilson was conducted to the spacious operating room of the company, where the "telegraphic friends" had assembled. On behalf of the donors, Mr. J. B. Bryant, in a neat speech, presented to Mr. Gilson, as a token of the high regard with which he was held by his professional brethren, a handsome and elaborate service of silver. Mr. Gilson, taken by surprise, replied in a few brief and well-timed remarks, cordially thanking the donors for their testimonial of esteem. The central piece of the silver set bore the following inscription: "Presented to S. L. Gilson by his telegraphic friends of Pittsburgh—New Year, 1873." The remaining pieces of the set bore the monogram "G." The gift is a deserved tribute to one of the many courteous and deserving officers of the Western Union Telegraph Company.—*Pittsburgh Post, Jan.* 1.

MODERN CONVENIENCE.

The establishment of private telegraphs all over our large cities is beginning to be one of the notable features of our material progress. Here again physical science is supplemented by that economic ingenuity which organizes and systematizes our daily life through co-operation and division of labor. Any one may *own* a private telegraph who chooses, but he may *hire* one just as well. Companies established for the purpose will stretch his wires for him, set up his batteries, and "coach" him in the few simple, practical methods of signaling required, into the bargain. For all this they will charge him a sum, which, in view of the convenience attained, is almost insignificant, and on any change of residence or place of business will patiently pick up their machinery, and set it all up again before the wandering client is fairly settled in his new abiding-place. Thus the merchant may be in immediate communication with his counting-room, and close bargains or make consignments from his library fire; or, from down town may talk familiarly with madame and the little ones about the afternoon drive or the evening's entertainment. The lawyer may know at his office just what is going on in court, and the politician, with his finger on the magic key, may make his busy brain felt in a dozen different places at once. The manufacturer may watch from his central point of observation the ramifications of his immense industry, directing its momentary and minutest details as if personally on hand. Sitting with an editorial friend the other day, whom late work and a headache had kept up town, we were amused and interested to see him step to his dressing-table, and, with a little buzzing and clicking of wheel-work, and a few mystic waverings of a ghostly index, inform "the office" that he should be down town at 2 P. M., to which the office responded with a cheerful but laconic O. K. As we had been told at the office an hour or two before that the luxurious journalist had just telegraphed to have his mails sent up, we were profoundly impressed with the coziness of the whole arrangement. And behold! we, too, have become a sharer in the blessing. Having, a few evenings ago, to send a message and parcel down town at a late hour of the evening, one touch of a little key at the office of the nearest hotel brought in three minutes a blue-coated, wide-awake little lad from the messenger office in Twentieth street at full gallop, and our parcel was on its way down town in less time than would have been needed to don the journalistic coat or draw on the editorial boots. The whole operation cost less than fifty cents! The same company expect soon to have the city partitioned out with districts and district offices, in such sort that a private family may communicate their wants, and call for messengers, police officers, fire service, and the like, in a very few minutes at furthest. Thus Bridget need not leave her steak spoiling at the kitchen fire while she runs for the doctor, and, as the circular roguishly suggests, the timid householder in process of being "burgled" may call down a squad of policemen on the artistic cracksman, who is working away at his area window in all the security of conscious well-doing.

Such improvements are welcome, not merely because they make life more sensuously comfortable and easy, but because they help to make it more effective. The province of society is to offer to mind the freest play and influence over matter, and everything which helps us to throw off the needless vexations and hampering limitations of time and space, gets the world forward, not merely in seeming but in fact. The future of this curious application of a familiar principle seems incalculable. It may not be many years before the housetops over our heads, the very steeples and flagpoles and trees shall be lit and tangled in an interlacing net-work of wires, over which the thoughts and plans, desires and passions of our crowded population shall go swarming and tingling with pulsation as constant as that of our lungs or our hearts—crossing, intersecting and blending, a fit emblem in their silent activity of the more evident strife and bustle, trial and work and suffering below.—*Scribner's for December.*

HOW TO PREVENT "TAPPING THE WIRES."

A SAGE BRUSH EDITOR BADLY HOAXED.

The following is clipped from the Gold Hill (Nevada) *News* of November 8, 1872:

"Instances have occurred, as is well known, of telegraph messages [illegible] isolated stations being stolen, not only by the surreptitious attachment of a recording apparatus to wires, but by the introduction of a short insulated wire in the neighborhood of the station, which would intercept the artificial earth currents produced by the working of the line, and thus reveal the purport of the messages which were being conveyed. It is found that one of the best means of protection against such attempts is the use of an earth plate, placed at some distance from the station, and buried, if possible, in the sea; and, by connecting the station with this plate, the earth currents are discharged in the line of least resistance, and cannot afterwards be made to surrender, by any of the arts and appliances referred to, the secrets they convey." (*Editorial*)

This is too much. Either the unfortunate editor of the *News* is laboring under the effects of an illy-digested dose of physical technics, or he has been outrageously hoaxed by some malicious practical joker. If the latter be the case, we hope, for the honor of the profession, that the perpetrator is not a telegrapher; if he is, then retributive justice would suggest that his person be connected to the *News* editorial sanctum by a "short insulated wire," in such a manner as to divert the line currents his way. Then, when the *News*-man's daily despatches are transmitted over the wires, the frame of the guilty hoaxer will be convulsed by successive agonizing galvanic shocks, induced by those same "artificial earth currents," until his mortal spark o'erleaps its condenser and the punishment ends with his "discharge."

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"PEPPER."

The following story originated, we believe, with the San Francisco *Post*. We give it in the words of the Californian writer:

Many amusing stories have been told of the festive freaks of telegraph operators, who, whenever afforded an opportunity for the display of their penchant for a good joke, rarely fail to improve it. Almost everybody has heard of the operator in an Eastern city, who, on a hot summer day, desiring to borrow a chew of tobacco from one of his fellows in the same room, instead of making his request known by words of mouth, chose what he deemed the least exhausting measure of indicting a despatch, which, traveling over a circuit of upward of a thousand miles in about two minutes, reached the identical office whence it started, much to the surprise of the other chap, who blandly shied his tobacco-box at the head of the irrepressible jokist.

It often happens that telegraphers are called into service at the representation of a stage play, in which occurs what is known as a "telegraph scene," such as the one shown in Byron's "Across the Continent," or Boucicault's "Long Strike," and it is then that the operator behind the scenes manages to amuse himself by "talking" to the "fraternity" in the audience, unknown, of course, to most of those present, who find no meaning in the "click" of the instrument.

As an evidence that the operators of our city are not behindhand in the matter of having their fun, the following is related of Jim ——, a well-known *attache* of the Western Union:

During the theatrical season of last year, the drama of "The Long Strike" was produced at one of our theatres, and for the manipulation of the telegraph instrument, which plays an important part in the most important act of the play, Jim was engaged.

His position was such that he could see the audience without being seen, and when, upon taking his position, discovering in the auditorium a brother operator from Memphis, by name Pepper—who had that day arrived in town—he determined to have a little sport on his own account.

Accordingly, when the time came for the sending of the first despatch, Jim loudly sounded on his machine the words, "How are you Pepper?"

The quick professional ear of Pepper caught the words instantly, and wondering "who the deuce it was," straightened up and stared at the stage as if he would have given two dollars and a half to know something more.

"Pepper, how's your mother?" came from the instrument, and Pepper, thoroughly mystified, turned confidently to his fair partner to express his utter astonishment at the most singular circumstance.

As luck would have it, the auditorium held quite a delegation of telegraphers, who by this time saw that Jim was up to one of his old tricks, and, with one accord, they began to look about the theatre for "Pepper."

Jim saw the effect of his experiment, and enjoyed it himself hugely.

Pepper hadn't got through telling his girl all about it when there came another message.

"That won't do, old Pepper. I know you well. and you hadn't better be fooling that confiding creature with any soft nonsense.

This roused the telegraph boys to the very pitch of curiosity, and many of them stood up gazing longingly about them as if their only object in life was to discover Pepper.

Pepper felt that they knew him, and the confusion which had been gradually covering his handsome features, grew into mortification when he saw so many eyes evidently levelled at him, and at last culminated in his withdrawal from the theatre. But Jim was bound to give a parting shot, and as he faded from view he heard borne to his ears: "Good-by, Pepper. Put your trust in Providence, but keep your powder dry.

Those who appreciated the affair were much amused, and so, indeed, was the victim himself, when, on the following day, he learned who had so neatly captured him.

THE following also comes from the Far West: A Spiritualist, old in the faith, and a firm believer, was recently badly sold by the telegraph operator at this place. The old gentleman never missed a chance to advance his belief and convert, if possible, skeptics and unbelievers. The operator was very skeptical and hard to convince, probably owing to his large rotund physical proportions, showing his love for the good things of this life. The old gentleman, at the time referred to, was trying hard to convince our telegraph man, and, among other things, said that he was a medium, and was satisfied that if he took hold of the key some departed operator would take possession of him and and run the "meersheen" The operator politely invited him to take a seat at the key-board and try his mediumistic skill. The old gentleman seized the key and commenced drumming a lively tune, but could write nothing legible or intelligible. The operator came to his rescue, and placing one of the medium's hands on the metallic bar and the other hand on a part of the machine which would form a circuit. When the key was used, the current was broken and preduced a shock. The medium received the shock, and although it was quite severe his countenance brightened up, and he exclaimed: "Oh—, they're coming! I feel—Oh! the spirits!" The more rapidly he played with the key, the oftener it shocked him and the more interested he became. The operator then placed the ground wire and gave him the benefit of the whole battery, The medium squirmed, cried, "Oh!—ah!—ugh! the spirits—ah—will now—oh—ah com—ugh!—mu ah—ni—oh!—cate ugh—ah—oh!" And, jumping up, he let go the key and cried out, "By JUPITER!! *that spirit is too much for me;—never met with his equal!*" By this time our fat telegraph man was rolling on the floor, his sides nearly bursting with laughter. The medium "smelt a mice," and left, satisfied with his experiment.

A NEW INVENTION IN TELEGRAPHY.—When Sir William Thompson invented his reflecting galvanometer, and showed its usefulness for telegraphic purposes, he insured the success of under-sea cables, whatever their length. With this instrument, the movements of the little reflector enables the clerk to read off the message by careful watching. But recently, Sir William Thompson has invented an instrument—the patent syphon recorder—which, as its name indicates, writes or records the message as received, on a strip of paper. It is an essential condition of such an instrument that it shall be very light; and the syphon, in this case, made of capiliary tubing, is not thicker than a horse-hair. Indeed, so small is the bore, that the ink will not flow therein of itself, but squirts out when electrified. The syphon is connected with a coil of copper wire, an electro-magnet and an ebonite disk, armed with pieces of soft iron, which, being attracted by the magnet, is kept rotating, and regulates the current flowing from the battery and the cable. Acted on by this current, the ink, as already stated, squirts from the syphon and writes a succession of dots and dashes which represent the letters of the alphabet. To an unaccustomed eye, the writing is a confused unmeaning scribble; but a good telegraph clerk will read it off as if it were ordinary writing. Thus a message will now, so to speak, deliver itself from the other side of the ocean, thousands of miles distant; and telegraphy has achieved another triumph.—*Chambers' Journal.*

NEW ELECTRIC PILE.—An improvement upon Grove's (platinum plate) battery is claimed by M. Koosen, by the substitution of permanganate of potassa for nitric acid. The pile is formed of a platinum plate in a mixture of the permanganate of potassa, with 1-30 part of sulphuric acid; and an amalgamized zinc element in dilute sulphuric acid. The inventor asserts as the result of over 100 trials, that the electromotive force is augmented; attaining to the double of that of a Daniell's couple of the same superficial area.

THE

ELECTRIC RAILROAD SIGNAL CO.

SPECIAL NOTICE.

OFFICERS OF RAILROAD COMPANIES, and others interested, are notified that this Company is the sole owner of the ORIGINAL PATENT for operating

ELECTRIC SIGNALS

by including a section of a railroad track in the electric circuit, which was issued to F. L. POPE, July 16, 1872. Railroad Companies are **CAUTIONED** against negotiating with unauthorized parties for the use of this Invention, as this Company will take legal measures to protect themselves against all **INFRINGEMENTS.**

J. N. ASHLEY,
Business Manager,
194 FULTON STREET, N. Y.

December 18, 1872.

F. L. POPE & CO.

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INSULATORS, BATTERIES,
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MAGNETIC AND DIAL INSTRUMENTS.

We have for sale also THE NONPAREIL TELEGRAPH INSTRUMENT for amateurs, learners and short lines.

A COMBINATION SET, comprising Sounder and Key on a handsome rosewood base.

Bradley's Box Relays and Sounders,
Bradley's Apparatus for Electrical Measurement.
Bradley's Naked Wire Helices and Magnet Spools to order, any desired size and resistance, at manufacturers' lowest price.

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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 5. NEW YORK, FEBRUARY 1, 1873. WHOLE NO. 126.

STATIC INDUCTION.

Electricity has the power of inducing the bodies in its neighborhood to assume a peculiar electrical condition without being in communication with them, which is termed induction. When an isolated conductor *a b* (figure 1) is approached by a body

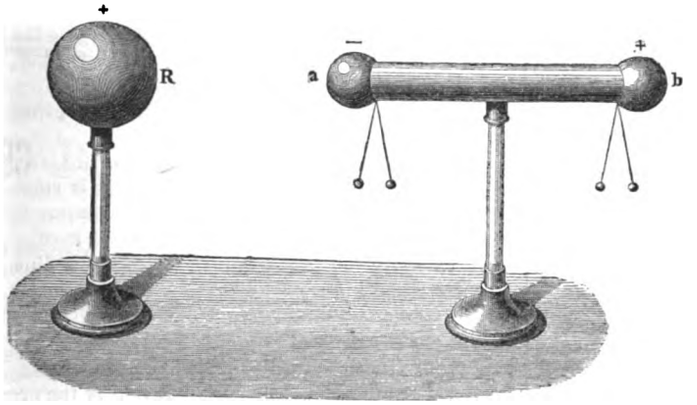


Fig. 1.

R, charged by either kind of electricity, for example with positive electricity, this conductor *a b* becomes likewise temporarily electrified. The + E of the body R attracts the — E of the conductor *a b*, inducing a negative electric state at *a*; and as no — E can be excited without as much + E, the other end *b* is positively electrified to the same extent. The proof that the induced electricities are equal in amount is found in the fact that they neutralize each other when the ball is withdrawn. If the cylinder were made up of two parts, each supported by a glass leg, the two electricities might be insulated on withdrawing the parts from each other while under the influence of the charged body, the one being + and the other —. The neutral line between the two electricities is found to be nearer to the end next the ball, and to shift nearer to that end as the ball approaches. The action of the electricity of the charged ball inducing in the conductor *a b* this peculiar electrical condition is called induction, and the conductor *a b*, in this state, is said to be polarized; that is, to have its poles or ends like a magnet, each having its similar but relatively opposite force.

If the charged body R had been negatively electrified, the extreme end *a* would have become positively and the end *b* negatively electrified.

The electricity produced in this case at *a b* is not caused by R communicating its electricity to the body *a b*, but by the division of the natural, not analyzed, electricity (± E) under the influence of the electricity in the neighborhood; whence the designation of electric repartition—electric influence or static induction, in opposition to the direct communication of electricity, which follows when R is brought in contact with *a b*.

The electricity which is present in the vicinity *a* of the body R is attracted, while, on the contrary, that which is present at the distant end *b* is repelled. When, consequently, the neighboring extreme end *a* is touched, whilst the charged body R remains in the neighborhood of *a b*—the electricity collected there will not be diverted, as will the distant electricity at *b*; whilst the former remains constantly attracted by the opposite one at R, the latter is repelled by R at *b*, and, consequently, flees away from it as far as possible. For this reason it is said that the opposite electricity at *a*, which is nearest to the dividing electricity at R is *bound*, while its correspondent at *b* is *free*.

That the + E at the further half of the cylinder *a b* is as free and insulated as if no — E existed on the other half, is shown by placing a cylinder near the first, forming a combination of it, as it were, without touching, when the second cylinder, under the induction of the + E of the first, is thrown into the same state as the first. This second can induce the same state in a third (figure 2) and so on. When the charged ball is withdrawn the whole series return to their natural condition, without being in any way permanently affected. The moment, however,

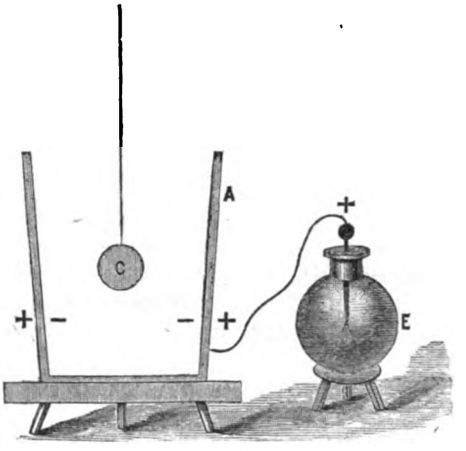


Fig. 3.

it is again brought near, each cylinder becomes again polarized, and there is manifested at the further termination of the last a + E, which would exert the same influence on a body connected with the ground as if a portion of the electricity of such a body had been actually communicated or transferred to it.

The amount of the electricity induced by an electrified body on surrounding conductors, is equal and opposite to that of the inducing body. Faraday proved this by the following beautiful experiment: He insulated an ice pail (Figure 3), ten and a half inches high and seven inches in diameter, and placed the outside of it in conducting connection with the knob of a gold-leaf electroscope (E). A round brass ball (C) suspended by a long dry thread of white silk, was charged with + E,

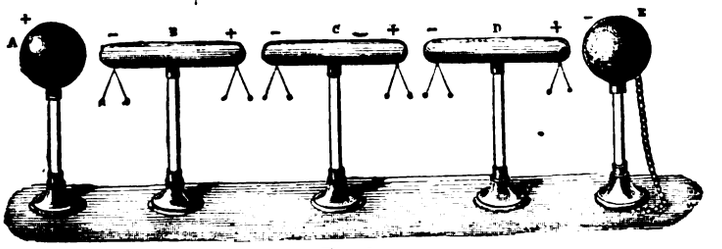


Fig. 2.

and introduced within the pail. The pail was thus subjected to polarization, the induced — E being on the inner and the + E on the outer surface. The divergence of the leaves, caused by the induced + E, increased as the ball was lowered, until it sunk three inches below the opening, when they remained steadily at the same point. The ball was lowered till it touched the bottom and communicated its charge to the pail, when the leaves remained in the same state as before. The ball, when lifted out, was found to be fully discharged, showing that the + E, developed by induction on the outer surface, was exactly the same in amount as that of the ball itself. The — E of the inside of the pail being equal to the + E on the outside, was, therefore, equal to the + E of the ball, but opposite in kind. He altered the experiment so as to have four insulated pails inside each other, and the effect on the outmost pail was in no way altered. No force was lost in the transmission from one pail to the other. We may conclude from this experiment that, on the walls of a room, or other conductors surrounding the charged body, the total amount of opposite electricity induced is equal in amount to that of the body itself.

If the hand touch the cylinder (fig. 1) when under induction, the pith balls next the charged ball diverge further than before, and the other two cease to be affected. In this case, electrically speaking, the cylinder is a portion of the ground, for the hand and body are conductors; its dimensions, therefore, being increased, more — E is developed than before, and the + E is thrown back into the ground and is lost; or, it may be more correct to say, that th + E now spread over the earth as well as the cylinder, an infinitely large surface is infinitely weak or nothing at any point. The — E is kept fixed in the part of the cylinder opposite the ball by the + E of the latter; and when the hand is *first* removed, and *then* the ball, it causes the balls at both ends to diverge permanently. Thus, *when an insulated body is charged by being uninsulated for an instant in the presence of an excited body, or charged, as it is termed, inductively,*

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its charge is of the opposite kind to that of the inducing body.

It would seem, moreover, by a careful study of the action of induction, that, when a body is charged by contact or spark, its charge is no less due to it. Let us consider the case of charging the cylinder (fig. 1) by the positively electrified ball. When the ball is brought near to the cylinder the latter becomes polarized, and the — E is turned towards the ball. When the ball is near enough, by spark or contact, the cylinder is permanently charged with + E. Now, this must occur in one or two ways: Either the — E of the cylinder, at spark or contact, partially neutralizes the + E of the ball, and a balance of + E flows over to the cylinder to increase the + charge inductively already there, or an equal amount of both electricities becomes neutralized at contact, and the + E of the cylinder already there is left alone without its negative twin. The latter alternative seems the more likely, on many grounds. It seems reasonable to expect that induction, which, at the beginning of its action, can partially charge the cylinder, can, when complete at contact, fully charge it; and it seems unlikely that the efflux of — E, and the extending of the + E, to which the action at the beginning tends, as is shewn by the shifting of the neutral line towards the point of contact, should be immediately succeeded by an influx of + E, as if the charging of the cylinder had to be done partially by one operation and fully by an opposite one. Faraday's experiment shews that no such counterflow takes place. As soon as the ball is low enough in the pail to expend all its inducing force on it, the + E induced on the outside is complete, for the leaves of the electrometer on the ball being lowered further, remain at the same point. The + charge which the pail keeps after contact is not greater than it was before it, for on contact the leaves are not affected. All, manifestly, that contact effects is a junction or neutralization of the + E of the ball, and the — E induced on the inner surface of the pail, leaving the induced + E of the outside as it was before contact. Similarly, in the case of the cylinder, the charge which it ultimately receives is fully developed in it at contact; contact merely neutralizing the — E and leaving the induced + E in undisturbed possession of it. The inside of the pail, as shown by the ball when taken out, is perfectly neutral. The + E which charges the cylinder is equal to the + E of the ball, which is neutralized at contact, for the — E which neutralizes the + E of the ball is the twin electricity of the + E of the cylinder. The result of contact is as if a portion of + E had actually been transferred to the cylinder, the loss of the ball being equal to the gain of the cylinder. Induction manifestly had as much to do with charging by contact, or *conductively*, as it is termed, as it has with charging by momentary contact with the ground in presence of an excited body, or *inductively*, only the electricities communicated are of opposite names.

But induction leads to discharge as well as charge. Let us discharge the cylinder already charged by contact. On the hand approaching to discharge it, the + E of the cylinder in its turn polarizes the hand, causing — E to appear on it, and sending the twin + E into the ground. At contact the + E of the cylinder and the — E of the hand or ground neutralize.

It was formerly charged positively by — E leaving it; it is now rendered neutral by an equal amount of + E leaving it.

Lastly, let us consider the condition of the cylinders (fig. 2) if the positively charged ball were discharged through them into a ball connected with the ground. The polarity of the cylinders would be the same as that shewn in the figure. As the inductive action increases, the opposite electricities become more developed at each end. We must place the cylinders at some distance from each other, and from the ball at the other extremity, so as to prevent them touching and acting as one cylinder in connection with the ground. Suppose them so placed that when a spark passes from the ball to the first cylinder, sparks also pass at the other interruptions. When these sparks occur, the ball and the cylinders are finally discharged. Making use of the same reasoning here as we have done above, we cannot conceive of this discharge taking place in any other way than that at each interruption two equal and opposite electricities neutralize each other. The charged ball becomes discharged by the cylinder next it yielding at the spark as much — E as it has of + E; the cylinders act in the same way to each other, discharging opposite electricities at each end; and the + E of the further end of the last cylinder neutralizes the — E of the ball connected with the ground. There is here no passage of the electricity of the ball into the ground, but the effect is the same as if it did. Induced electricity is the term applied to electricity that appears on bodies before actual contact or spark. It is the forerunner of charge and discharge; these being, in fact, the crisis to which induction tends.

It would thus seem that, in whatever way a body acts, whether as giving or receiving a charge, discharging or lying in the path of a discharge, in every case it is by electricities leaving it and becoming neutralized or disappearing by spark or contact. The usual phraseology of electricity supposes the actual passage of the electricities looked upon as fluids, from, into and through conductors, but the very existence of induction renders such a supposition untenable.

Electric terms, like many others, however, in science, though based on a wrong supposition, distinguish quite definitely the phenomena they describe. Moreover, they express what is true in effect, though not in process, and if we look on electricity as a force of which the + and — electricities are merely the manifestations, we may speak of it as entering, leaving and traversing bodies, as one of its manifestations is, according to the usual phraseology, considered to do.

TEST OF NEW WIRES BETWEEN RICHMOND, VA., AND WASHINGTON, D. C.

Jan. 5, 1873. Weather—hard rain six hours.

Wire.	Station Tested with.	Distance. Miles.	Total Resistance of Wire. Ohms.	Mileage Resistance of Wire. Ohms.	Total Resistance of Insulation. Ohms.	Mileage Resistance of Insulation. Ohms.	Ratio Resist. of Wire to Resist. of Insulation.
A	Wash'n, D.C.	115	1496	13.0			1 to 31.3
	"	115			46,863	5,389,200	
B	"	115	1496	13.0			1 to 18.1
	"	115			27,171	3,124,600	
C	"	115	1508	13.1			1 to 24.7
	"	115			37,299	4,289,300	

Jan. 12, 1873. Weather clear and cold.

A	Wash'n, D.C.	115	1527	13.3	
B	"	115	1538	13.4	
C	"	115	1532	13.3	

The wire is No. 8 gauge, manufactured by Messrs. Washburne & Moen. Insulation glass and pin on four-foot cross arm. Pin and cross arm having two coats of Prescott's compound paint.

NEW THEORY OF THE AURORA.

The *English Mechanic* publishes the views of Dr. Wolfert, a German observer, on the nature and origin of the aurora borealis, which, it will be noticed, are based on speculation, which do not connect the phenomenon with a magnetic or electric source. Dr. Wolfert says: "The sun's rays, falling on the earth, are variously reflected according as they fall vertically, or at an angle more or less obtuse. The earth being conceived as a large mirror, many of the obliquely incident rays will be reflected to a part of the celestial vault on the night side of the earth." The zodiacal light, he ascribes to the irregular reflection of sunlight from water, and similarly the vast fields of ice in the polar regions, he considers, may be regarded as an imperfect mirror irregularly reflecting the incident light. The rays which fall most obliquely are the most abundantly reflected; and as the quantity of reflected light increases with the angle of incidence, adds the author, we may see how the reflected sunlight illuminates in the highest degree the night skies of the region nearest the pole; further, the great similarity of the incipient light of the aurora to moonlight, is thus explained, the latter being also sunlight reflected.

The rays falling on the ice at an angle of 40°, are, however, dispersed as well as reflected. It is commonly said that the point of origin of the aurora is indicated by the direction of the magnetic needle. More correctly, according to Dr. Wolfert, a line drawn from the sun at right angles to the horizon and prolonged, would be the middle of the phenomenon. On this supposition an advance of the central part of the aurora to the north is explained.

The grounds on which Dr. Wolfert rejects the ordinary hypothesis of the aurora, may here be briefly stated. The strongest reason given for supposing a magnetic origin of the aurora, is that the phenomenon seems to originate in the quarter to which the needle points. It is replied that in expeditions to Boothia, Felix and Melville Islands, the needle has in these places, taken a vertical position, and even at times pointed southward, while the aurora appeared in the north as usual. If the aurora consisted of a streaming of electricity from the magnetic pole, it would be difficult to explain how an observer at the pole always sees the light beyond the horizon, as at other places. When lightning strikes a ship, the compasses become irrecoverably useless. But ships have ventured in the midst of these (supposed) currents from the pole, and their compasses have been but temporarily disordered. Neither man nor beast suffer from such currents, nor do sensitive electrometers show any change in atmospheric electricity when the phenomenon occurs.

It is said that the needle shows irregularities before the aurora. But this is by no means a constant occurrence. The polar light and the electric (disturbing) currents may have a common cause. Heat also diminishes the attractive force of magnets, and this might account for the variation of the needle. If the phenomena were electric, it would be difficult to account for their punctual regularity of appearance and disappearance in nothern regions. This is explained, however, when we connect them with the sun.

In recent times, it has been supposed that the sun spots are in some way connected with the aurora. The recurring frequency of the latter every ten or eleven years, is found to coincide with the periodic maxima of the former. Dr. Wolfert suggests the following as a possible explanation: If it be true that the spots diminish the solar radiation, the cold winters that recur in these periods may be thus caused. Now, cold winters imply an extension of the polar ice southwards, and therewith an enlargement of the reflecting surface in the same direction.

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WHO PERFECTED THE TELEGRAPH.

It is the common lot of inventors to toil long and fight manfully against poverty, indifference, and detraction. When they have surmounted all these obstacles, and have shown the world that they have discovered something which will benefit humanity, it is all at once found that they have only announced what others had learned before, and a long series of law suits with bold pretenders must be fought out before genius can get its pecuniary rewards. Such has been the fate of most of the pioneers in practical science, and such was that of the late Samuel F. B. Morse. He lived long enough, however, to beat down all opposition, and died with a general recognition of his claims to the gratitude of humanity.

To attempt a reversal of this verdict is a difficult and disagreeable task. It has been undertaken, however, and the statements upon which the case rests are important enough to merit recapitulation. We give them as we find them, leaving the reader to estimate their conclusiveness for himself.

There has just been published in Cincinnati, a volume, of nearly 800 hundred pages, entitled; "Up the Heights of Fame and Fortune, and the Routes taken by the Climbers to become Men of Mark." The work contains interesting sketches of inventors, writers, scientists, and financiers who have special claim to the title of self-made men. It is illustrated with engravings of ancient steamboats, including Western crafts, and locomotives, and by steel portraits. These features, however intrinsically attractive, will excite the attention of the world at large far less than the notices of Professor Morse and his associate, Alfred Vail. To the latter is ascribed the invention of the first available telegraph machine and his partner though admitting that he was not unaided in his invention, is characterized as disingenuous in claiming more than he deserved in producing the perfected and practically serviceable apparatus.

Alfred Vail was born in New Jersey in 1807, and early displayed great mechanical ingenuity. While a student under Prof. Morse at the New York University in 1835, he saw the latter's first rude machine, and became an owner of one-eighth of the patent by virtue of engaging to devote his personal services and skill toward perfecting the invention. He also offered Prof. Morse much needed pecuniary aid. In 1853 the Professor said that to the joint liberality of Vail's father and brother, "but especially to Alfred's attention and skill, and faith," was due the success of his early endeavors to bring the telegraph before the public.

His biographer continues:

From his peculiar experience in all that related to the invention, he was appointed one of Mr. Morse's assistants, on the passage of the telegraph bill in 1843. In his latter years Prof. Morse narrowed his recognition of Vail's connection with the telegraph to the one point of pecuniary aid.

If we may believe the writer of Vail's biography, his subject did more than this.

The Morse Machine of 1836 "passed into Vail's hands in 1837 for an entire mechanical reconstruction throughout, to speak a language not entirely unknown to the first machine, but to perform entirely new functions and to produce an entirely new system of signs and letters, which the first by its structure was physically unable of being made to speak. Alfred Vail invented the first combination of the horizontal lever motion to actuate a pen, pencil, or style, and the entirely new telegraphic alphabet of dots, spaces, and marks, and he did so prior to September, 1837, the month when the old instrument passed into his hands for reconstruction. His more perfect invention of a steel style upon a lever which could strike into the paper as it was drawn onward over a ground roller, and emboss upon it the same alphabetic characters, was not invented until 1844, about the time the first line of telegraph began to operate between Baltimore and Washington. This instrument, somewhat transformed, still holds its place as practically the best ever invented."

The author quotes extensively from the correspondence between Professors Morse and Henry, and reproduces a plain spoken letter from Vail, to show why he did not urge his claims to the credit of the invention. This letter is deemed of so much importance by the publishers that they have given it in lithographic fac-simile. It is as follows:

The lever and roller were invented by me, in the sixth story of the New York *Observer* Office, in 1844, before we put up the telegraph line between Washington and Baltimore, and this *combination* has been always used in Morse's instrument. I am the sole and only inventor of this mode of telegraph embossed writing. Professor Morse gave me no clue to it, nor did any one else, and I have not asserted publicly my right as first and sole inventor, because I wished to preserve the peaceful unity of the invention, and because I could not, according to my contract with Professor Morse, have got a patent for it.

ALFRED VAIL.

As early as 1847 Prof. Morse urged Mr. Vail to sell to him his interest in the telegraph for $15,000, but he refused. He died in January, 1859. Amos Kendall, a friend of both parties said: "If justice be done, the name of Alfred Vail will forever stand associated with that of Samuel F. B. Morse in the history of the invention and introduction into public use of the electro-magnetic telegraph."

After Mr. Vail's death his rights were less recognized than before. Prof. Morse said little about him, and that little, it is contended, was very inadequate. In his address at the inauguration of a statue in his honor he referred to him:

Alfred Vail of Morristown, New Jersey, with his father and brother, came to the help of the unclothed infant, and with their funds and mechanical skill put it into a condition creditably to appear before the Congress of the nation. To those New Jersey friends is due the first important aid in the progress of the invention.

This, in the opinion of Mr. Vail's advocates, was the truth, but not the full truth. They do not deny Prof. Morse the honor of the first conception of the telegraphic system, but they assert that he did not give the credit of its perfection where it was due. They also claim to have learned in a "semi-private way" that during his last illness the Professor expressed anxiety to do justice to Mr. Vail. We attach little importance to prying gossip of this kind, but the statements previously presented are of sufficient weight to merit some notice. If injustice has been done to Mr. Vail, it is not too late to do him posthumous honor and rescue his name from the obscurity into which it has fallen.—*Cincinnati Gazette.*

THE DUPLEX TELEGRAPH INSTRUMENT IN ENGLAND.

An alleged important discovery in Telegraphy is just announced in England, consisting in a device said to be original with Mr. Preece, the Postal Telegraph Engineer. It consists in an arrangement of instruments for sending messages in both directions at once by the use of one wire.

This is an American improvement, invented here some years ago, by J. B. Stearns, and by him patented. It has been in use on the lines of the Western Union Telegraph Company in this country for a considerable time, with much success. It doubles the transmitting capacity of every telegraph wire, and is regarded here as one of the most important inventions that have been made since the introduction of the electric telegraph system.

We are glad that our British cousins have at last waked up to an appreciation of its value, even if they credit the discovery to the wrong individual. It might be well for the British telegraph authorities to send over here for a few hundreds of the Stearns machines and put them in use at once; thus immediately doubling the capacity of their wires, and saving them from further experimentation upon the subject.—*Scientific American*

RATIONAL GOVERNMENT ENTERPRISE.

The telegraph in private hands is an all-night business. The postal service in government hands has its departmental hours. When the government takes the telegraph and hitches it to the postal service, it must either reduce it to departmental hours, which would be equivalent to setting the world back half a century, or it must do an all-night business. If it is proposed that the government telegraph shall try to keep up the accommodation that private management has established, and shall do the night work that is demanded, would it not be well for it to first get its hand in by doing what night work is needed by general business and the press, in distributing the matter received by the mails, so that it can reach parties if received after nightfall? This, and the reasonable dispatch of letters from the place of mailing, would save the press much expense in telegraphing, and would enable business men to shorten the time of receiving and answering letters to the extent of one business day. In many ways the management of the Post-office Department could be improved so as to increase the business of the mails and save telegraphing, if the same enterprise and care for the public convenience were brought into it that private management has established in other carrying business.

One of the reasons given for government assumption of the telegraph is that it would reduce the cost, and thereby increase the accommodation of the public. But the postal department does not now get the business that legitimately belongs to it, nor do the duties it ought. It is far inferior to the service done by the telegraph and express, through the more energetic management and responsibility which business management has created in these lines. The Post-office neither has the business that belongs to it, nor does the service the public have the right to expect from it. It is slow in all its movements, departmental in its hours of business, and wholly irresponsible. No matter how much it may register letters, it shows the measure of its trustworthiness by refusing to be responsible for them. It does not serve the demands of the great newspapers, either by carrying news to them with sufficient promptness, nor by carrying the papers when printed. Private agencies have to be called in to do this work. The great news business—the business of gathering and publishing intelligence—has chiefly to be done outside the postal department, because of its lack of energy and wieldiness.

The Postmaster-General is looking about for other worlds to conquer; yet his own province is half a century behind the age, as measured by the energy, practical accommodation, and responsibility of other branches of the carrying business. We suppose no one is to blame for this. It is the way with government doings, especially in a government of the elective kind, in which the public offices are regarded as made for the reward and convenience of those who hold them. The telegraph and the express would have been as far back as the mails if the government had managed them. There would be no night work of the telegraph. Deliveries by carrier would be made not more than twice a day, even if once did not suffice. The circuit would be cut off at 7 o'clock, and 24 hours would be thought short enough for receiving and answering a telegram. The same departmental system would prevail in the government express, and no matter what it charged, it would not venture to trust its employés so far as to make itself responsible for packages. The Post-office thinks it can assume what the telegraph has done under private management; but it would be far more rational for it to try to introduce into its own province some of the energy and accommodation and responsibility that private management has established.—*Gazette, Cincinnati.*

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CORRESPONDENCE.

HONOR TO WHOM HONOR IS DUE.

To the Editor of the Journal of the Telegraph:

It is to be regretted that in your honorable mention of the services of Messrs. Barr, of Elizabeth, and Ricker, of Newark, during the troublesome days succeeding the storm of January 5th, you overlooked Mr. Hynes, of Williams Bridge. Only one out of the thirty-four wires leaving the city on the Harlem and New Haven Railroads remained intact to Williams Bridge on the day following. With the instincts of a veteran in the service, Mr. Hynes discovered it and put himself in communication with the metropolis. Like a faithful sentinel "standing by his gun," he stood by that solitary wire all day Monday and slept by it all Monday night, and when on Tuesday the other wires showed spasmodic signs of vitality, and the chiefs in New York thought an additional circuit might be made up, quick as lightning this minute man responded to their summons, and executed the directions given with commendable alacrity. Without detracting from the merits of others, he is looked upon in the New York office as the most agile of all with whom they have to do, in making changes with the wires, frequently effecting a connection before the order directing it has been entirely sent. If Mr. Hynes could but get just such a switch as he wants, he would be the happiest man in the service.

"FIAT JUSTITIA COELUM RUAT."

STRAWBERRY POINT, Ia., Jan. 10, 1873.

To the Editor of the Journal of the Telegraph:

This is the terminal point of a line from Davenport, Ia., with a main battery at the latter place only. My wire is grounded in a cellar, in ground full of water and where frost never enters. During a severe storm, a few days since, the wire was grounded at first station below me, about twenty-one miles from here. For two days I had sufficient current to get everything that came over the wires, but could not, myself, get a response from any office on the line. I think the solution of the problem of my getting circuit with ground wire on below me, is this: My ground connection being so much better than the one below, that part of the current passed over and came to me. I can't understand why I could not get answer from offices below me. Will you please explain the cause of this in your next issue.

NOVICE.

Answer.—The fact of your ground connection being so much better than the ground formed at the station referred to, was not the cause of your being able to hear what was transpiring beyond. It was owing to the imperfect nature of the connection with the ground at the point below you, that a portion of the current reached your office. This connection, however, was sufficiently good to form a circuit with the battery at Davenport, and so prevented you making yourself heard.

DALTON, GA., Jan. 12, 1873.

To the Editor of the Journal of the Telegraph:

Suppose a customer (a traveling man), newly arrived, requests me to notify the manager of another office to forward any telegrams to his address, to this place, should it be done free, or charged for as on other business? MANAGER.

Answer.—Such a message must be charged for. No messages are entitled to be transmitted free over the wires of this Company, unless duly authorized.

ROSELLE, N. J., Jan. 18, 1873.

To the Editor of the Journal of the Telegraph:

If an insane woman (though it not be known to the receiving clerk at the time) were to go to an office and have a telegram sent, and afterwards her husband should come and inform the manager of her insanity, and at the same time forbid his receiving another message from her, would he be justified in sending a second message for that person? It conflicts in no way with rule 20. G. A. R.

Answer.—We do not see how the message could be refused if payment be tendered. The fact that you had been notified by her husband or any other person that the woman was insane, would not necessarily prove such to be the case. You are not obliged to obey the *dictum* of any second party as to the reception and transmission of any message offered, but will be governed wholly by the regulations of the Company.

To the Editor of the Journal of the Telegraph:

A party here wished to send a message, but said they would not pay for an answer if any came, and I refused to send the message unless they would guarantee payment for answer, as their message read as though they required one, and pertaining to their own business. They think I am not right in exacting charges for an answer to a message, which answer they did not want. Please let me hear what you think of it in your next issue, and oblige.

The message read as follows: "Why don't our stoves come. Been on your line since Dec. fifth."

Answer.—Rules cannot be framed to meet every question which may arise. Whenever the letter of a regulation cannot be met, an intelligent interpretation of its spirit becomes a duty. The regulations governing the service of the company are intended for the protection of its interests, and not to repel business offered. With the explanation given you, you could not rightfully exact the guarantee. The proper course would have been to have sent the message, and with it an office message stating that no answer was required, but if one was offered, to require that it should be prepaid.

To the Editor of the Journal of the Telegraph:

Often parties get off trains and come into offices, write their messages, but before having time to count words, make change, &c., the trains start. They will cry out, Send it collect. This, in most cases, would be all right, and would be a great accommodation to the sender, but, as the rules hold the operator responsible, it cannot be sent. Probably in most cases they would be paid. Would it not be better to send such messages collect, and in case they were not collected upon, the operator to send them in with proper explanation, thereby accommodating our patrons and benefit the company pecuniarily at the same time. This is also the case with the class of people called "drummers;" they want to telegraph to their firms collect, which we decline to do; they become indignant and will not send it. There are cases where, I think, it should be left to the operators to use their judgment, and not be held responsible for the amount.

Answer.—No discretion can be allowed in cases of this nature. There is no more reason that a message should be taken from a passing traveler, at the company's risk, than that a tailor should furnish him with a suit of clothes upon similar terms of payment. The same reasoning applies to the messages offered by persons designated by our correspondent as drummers. While the company are willing and anxious to accommodate customers to the fullest extent, they are unwilling to do so under any liability of loss for their valuable time and labor expended in so doing. Rule 11 covers service of this character, and its provisions must be adhered to.

W. C.—No railroad operator has a right to break in on an operator who is sending commercial business unless he has matters of importance to communicate about. Any operator who should break in for the purpose of inquiring the time of day, or any other trivial question, would deserve, and probably receive, summary treatment at the hands of his Superintendent. Should a case of this kind occur, the operator sending commercial messages should promptly give up the circuit and report the facts to the Superintendent.

M. A. B.—You had no right to furnish a copy of a received message to any person other than the party addressed, no matter upon what plea. If trouble arose, you, undoubtedly, would be held responsible.

Dominick.—In Rule 13, the charge of one-half the usual rates means one-half the usual rate for ten words. This is an important regulation, and customers should be made familiar with its working. Were it generally observed, there would be no necessity for many of the office messages which now encumber the wires, and customers would be better satisfied. We quote the rule for general information:

"Whenever a person sending a message desires to know that his correspondent has received it, such information may be furnished to him from the manager of the office to which the message is transmitted at one-half the usual rates. In such cases the signal "34" will be sent with the message, signifying that the sender wishes a reply from the manager of the office at the place of its destination, stating whether the message has been delivered to his correspondent or not."

C. A. S.—Tariff books of the Western Union Company are not for sale.

F. P. D.—We have no copies of the engraving of Prof. Morse.

BORN.

ORVIS—At Manchester, Vt., Jan. 15, 1873, to L. C. Orvis, Manager W. U. Tel. Office, a son.

RUNYSON.—At Reading, Pa, Jan. 6, 1873, to W. H. Runyson, Manager W. U. Tel. Office, twin sons.

MARRIED.

FICKINGER—DUNN.—In Girard, Pa., at the residence of the bride's parents, Jan. 16, 1873, by Rev. J. W. Lowe, H. M. Fickinger, Train Dispatcher on the Franklin Division, L. S. & M. S. Ry., to Miss Mary A. Dunn, daughter of John Dunn, Esq.

McDONALD—BURNHAM.—At the residence of the bride's father, Halifax, N. S., Jan. 22, 1873, by Rev. John E. Goucher, David McDonald, Operator W. U. Tel. Office, Halifax, to Georgiana, second daughter of James F. Burnham, Esq.

RAPER—CAMPBELL.—At the residence of the bride's parents, near Frankfort, Ind., by Rev. Mr. Koutz, Jan. 1, 1873, Mr. Geo Raper to Miss Nannie E. Campbell, Manager W. U. Tel. Office, Kingans Stock Yards, Indianapolis, Ind.

DIED.

SPERRY.—At Meriden, Conn., Dec. 16, 1872, of heart disease, A. W. Sperry, late Operator American House, Boston, Mass., aged 19 years.

OBITUARY.

Dr. THOS. L. A. VALIQUET died Dec. 30th, 1872, of small-pox, at his residence in Chicago, Ill. Deceased was for many years an operator in that city, having filled the position of all night manager creditably for a number of years. About a year previous to his death he graduated from Rush Medical College, Chicago, with the highest honors, and at the time of his death held the position of Consulting Physician in one of the hospitals of that city, the duty of which position he performed faithfully in connection with his other situation as telegrapher. Being of a kind, warm hearted nature, he had many friends in the profession. Peace to his ashes.

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FOREIGN TELEGRAPHIC ITEMS

THE WEST INDIA AND PANAMA CABLE.

The *Panama Star and Herald* publishes a report of the annual meeting of the West India and Panama Telegraph Co. The shareholders expressed themselves dissatisfied with the long delay of the Chancery suit, and thought it would be better to settle the differences with the contractors. We are sure the public on the west coast of the Pacific will be of the same opinion. Hitherto they have been tantalized, first, by the announcement that the Colon and Jamaica cable was open to the public—and then to be disappointed as to the regularity with which the telegrams were dispatched to their destination—and, finally, after being laid and proclaimed to the world to be all right, it is now again all wrong.

A CONTRACT has been signed by Messrs. Siemens Brothers, to lay a submarine cable (under exclusive privilege for forty years) between Rio de Janeiro and the cities of the River Platte (Montevideo, in Uruguay, and Buenos Ayres, in the Argentine Republic). This cable is for the Platino Braziliera Telegraph Company, represented in London by Mr. A. Rieke. It is to be laid within six months, the capital having been entirely subscribed in South America.

THE tender of Messrs. Siemens Brothers, telegraphic contractors, has been accepted by the Government for the construction of a line from Fort Beaufort to Colesberg.

THE total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ending the 21st Dec., was 295,856—being an increase of 47,641 as compared with the corresponding week of last year.

THE total number of messages forwarded from postal telegraph stations in the United Kingdom, during the week ended Dec. 28, 1872, was 232,329—an increase over the corresponding week of the previous year of 49,309.

NATIVE merchants have petitioned the Japanese Government for permission to construct railroads and telegraph lines. The petitions were granted. The work is to be done under the supervision of the Public Works Department.

THE telegraphic lines of the Republic of Salvador, C. A., are all reported in good working order.

IN Nicaragua, C. A., Don Adolfo Escobar has been named Director-General of Telegraphs.

THE English Telegraph Construction and Maintenance Company have made good progress with the new French Atlantic cable, and a portion of the line has already been shipped on board the Great Eastern. Many improvements have been introduced, with the object of securing complete insulation and protecting the shore ends from abrasion. Portions of the old Mediterranean cable, taken up after twelve years' submersion, are exhibited at the company's works. In some parts the cable has been encrusted with marine formations and deposits; in other sections the outer coatings have been completely eaten away. The appearance of the Mediterranean wire has taught the manufacturers several useful lessons in the discovery of means by which the destructive agencies of the ocean may be overcome.

AMONG the notices in the Barbadoes House of Assembly, was one to grant a subsidy to the West Indies and Panama Telegraph Company.

THE direct Spanish Telegraph Company have announced that direct telegraphic communication with Spain has been established by the laying of a submarine cable between Bilbao, in Spain, and the Lizard, in Cornwall, and that the line has been opened for public traffic.

A DECREE has been issued granting a concession to Lascarte for laying a telegraph cable between Spain and Cuba. Offers have been received by the Spanish Government, from British Companies, for the purchase, maintenance and management of the telegraph lines.

Mr. EDEN, in-door engineer in the Edinburgh telegraph office, has invented a system by which, with the existing instruments, it has been found practicable to send messages from both ends of a single wire simultaneously. The invention has been tested between Edinburgh and Glasgow, and it has been found that one wire is capable of doing double work.

THE Melbourne *Argus* of the 7th of November, speaking of the telegraphic communication between the mother country and the colonies, says: "Our English telegram this morning well illustrates the advantages we enjoy from direct communication with the mother country. The election of a President of the United States of America took place on Tuesday, and the result was on Wednesday transmitted from London to Australia, the intelligence of General Grant's re-election reaching Melbourne soon after eight o'clock last night. This achievement may be properly recorded amongst the telegraphic triumphs of the age."

THE SOCIETY OF TELEGRAPH ENGINEERS.

The following is a list of the names of the officers of the Society of Telegraph Engineers for the ensuing year, elected at the general meeting held in the meeting room of the Institution of Civil Engineers: President, Frank Ives Scudamore, C. B.; Past President, C. W. Siemens, F. R. S., D. C. L.; Vice-Presidents, Lord Lindsay, Sir William Thomson, and Messrs. L. Clark and R. S. Culley; Council, Colonel Stotherd, R. E., Prof. Foster, F. R. S., Captain Colomb, R. N., Major Malcolm, R. E., Major Webber, R. E., Prof. Abel and Messrs. E. W. Whitehouse, C. F. Varley, W. H. Barlow, W. H. Preece and Carl Siemens; Associate Members of Council, Prof. Bottomley, and Messrs. J. Bordeaux and H. G. Eriehsen; Treasurer, Major Webber, R. E.; Honorary Secretary, Major Frank Bolton; Auditors, Messrs. J. Wagstaff Blundell and F. C. Danvers; Secretary, Mr. G. E. Preece.

DAMAGE TO TELEGRAPH WIRES AND CABLES.

The late spell of warm weather, in its action upon the ice in the Hudson and Delaware rivers and the streams feeding them, caused considerable damage and trouble to telegraph wires and cables. Closely following upon the rise of the Delaware, which, at Trenton submerged all of the wires crossing upon the bridge and inflicted other damage to telegraph property, we learn that the outgoing ice at Albany, N. Y., caught five cables belonging to the Western Union Telegraph Company, each containing seven wires, pulling them out from the cable house on one shore, but fortunately they remained fast at the other, and can easily be relaid when the state of the river renders it practicable. Connection was at once made by stringing wires across the bridge, and but little or no delay occurred to business.

At Stockport, lower down the river, the bridge was carried away, and with it went six wires, all the wire upon that route. The cable crossing Catskill Creek was also torn away. They have since all been repaired.

ON MAGNETIC DISTRIBUTION.

BY M. JANIN.

M. Trève has communicated to the Academy of Sciences, Paris, a paper on "Magnetism," in which he announces, amongst other things, that the poles of a magnet are displaced and removed from its extremities when a soft iron armature is fitted to them. He believes that he demonstrates this, by placing opposite the magnet a magnetic needle, and showing that its direction changes after contact is made with the armature, whilst admitting that the pole is thus prolonged in the direction of this needle.

Firstly, it is necessary to define the word pole; it must also be remarked that in this experiment the magnetic needle is opposed to the attraction of the steel which forms the magnet, of the iron which constitutes the keeper, and also to the attraction or to the repulsion of the free magnetism of the magnet. Its direction follows the result of these very complicated actions, which depend on the distance, the weight, and the shape of the armature, and above all upon the distribution of the magnetism in the magnet itself and its keeper. It is therefore apparent that the direction accruing from so many diverse causes cannot lead to any definite conclusion.

That which ought to be first settled in this question, is the distribution of magnetism in the magnet both before and after the application of the keeper. This is a manner which has occupied my attention for a very considerable time, and I take the present opportunity of saying a few words thereupon.

I studied this distribution by two processes, the one of which corroborates the other. The first consists in placing upon the extremity of a magnet a small soft-iron electro-magnet enveloped by a copper wire communicating with a galvanometer. An induction current is thus produced, causing a deflection of the galvanometer, and the measure of the arc of impulsion enables the intensity of magnetism at different points touched to be very readily measured.

The second process is very analogous to that of Coulomb: it consists in placing upon the spot of which it is desired to study the magnetic character, a small sphere of soft iron, attached to which is a device by which it can be dragged away from contact. The tension, at the moment it is detached, is proportionate to the amount of magnetism at each point of contact.

If the magnet has its extremities free, we can recognize that the free magnetism increases progressively in intensity from the neutral line to the extremities. The curve of intensity is very nearly that which Coulomb had indicated.

When the keeper is applied, all is changed; two poles appear at the two extremeties of the keeper, the free magnetism in part disappears. Receding from the two extremities it reaches a maximum, again decreasing towards the neutral line. The conditions of these modifications are very complicated, and require searching investigation. They contribute to produce the changes in direction of the needle examined by M. Trève; but these changes cannot in any case disclose the magnetic distribution within the bar, and it is not desirable to assume that they indicate any change in the position of the poles of the magnet.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
February 1, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

On and after February 1st, 1873, (with the exception named below,) there shall be no rates between Western Union offices higher than $2.50 for messages of ten words. All rates, therefore, which are at present higher than $2.50, should be reduced to that amount.

For example, a message sent from New York to San Francisco, whether paid or collect, should be checked at rate of $2.50 and 17. If received paid from San Francisco, at rate of $2.50 and 17, but if "received collect" from San Francisco, it should be checked at rate of $2.75 and 18.

EXCEPTION.—The tariff on messages "received collect" from offices in Nevada, California, Oregon, Washington Territory, British Columbia, and Kelton, Ophir, Simpson's Springs, Stockton, Deep Creek and Tooele City in Utah, by offices of the Eastern, Central (except those west of Omaha referred to hereafter) and Southern Divisions, will be $2.75 and 18.

Offices west of Omaha will make no extra charge for messages "received collect" from those offices in Utah (named above), Nevada or California, to which their present rate is less than $2.50. Government rates are to remain unchanged.

Beaver Meadow, Ala., closed.
Fox, Ill., closed.
New Memphis, Ill., re-opened.
Fossil Creek, Ks., changed to Russell, Ks.
Kingsville, Ks., closed.
Wilson's Creek, Ks., changed to Bosland, Ks.
De Soto, Ks., closed.
Howard, Mich., the office on other lines, printed in tariff book, is in Montcalm County.
Standish, Mich., P. O. A. is Granton, Bay Co.
Point-du-Chene, N. B., closed.
Messages may be taken for Hamilton College and Franklin, N. Y., to be delivered from Clinton, N. Y. Twenty-five cents for delivery should be collected.
Plank Road, O., changed to Randall, O.
Florence, O., P. O. A. is Campbellstown, Preble Co.
Confluence, Pa., P. O. A. is Confluence, Somerset Co.
Glencoe, Pa., P. O. A. is Southampton Mills, Somerset Co.
Marion, S. C., re-opened.
Big Bend Tunnel, W. Va., changed to Talcott, W. Va.
Miller's Ferry, W. Va., changed to Hawk's Nest, W. Va.
Richmond Falls, W. Va., changed to Meadow Creek, W. Va.
Stretcher's Neck, W. Va., changed to McKinderee, W. Va.
Alderson, W. Va., should read { 35 2 133 Greenbrier W. S. Spgs., W. Va. / 65 4 203 Huntington, W. Va.
Bowyer's Ferry, W. Va., changed to Sewell, W. Va.
Bitter Creek, Wy., should read 55 4 564 Rawlins, Wy.
Black Buttes, Wy., " " 65 4 564 Rawlins, Wy.
Carbon, Wy., " " 55 4 556 Laramie City, Wy.
Hallville, Wy., closed.
Medicine Bow, Wy., should read 55 4 556 Laramie City, Wy.
Point of Rocks, Wy., " " 65 4 564 Rawlins, Wy.
Red Desert, Wy., " " 55 4 564 "
Rock Creek, Wy., " " 55 4 556 Laramie City, Wy.
Table Rock, Wy., " " 55 4 564 Rawlins, Wy.
Van Dyke's, Wy., closed.

NEW OFFICES.

285 Milner, Ala.
* Wethersfield, Conn.....30 3 32 Hartford, Conn.
67 Hockessin, Del.
* Milton, Fla.....100 10 305 Pollard, Ala.
266 Pryor's Sta., Ga.
319 Dahlgren, Ill.
523 Bosland, Ks.
523 Russell, Ks.
339 Jordon, Ky.
21 Forest Hill Station, Mass.
269 Barnetts, Mich., P. O. A. Shelby, Oceana Co.
270 Howard Station, Cass Co., Mich.
148 Pinconning, Mich.
41 Roseville, N. J.
101 South Livonia, N. Y.
87 Seaboard, N. C.
180 Randall, O.
151 Rush Run, O.
76 Baldwin, Pa., check Harrisburg, Pa.
59 Douglasville, Pa.
470 Kilgor, Texas.

* Hinton, W. Va.....{ 50 3 103 Greenbrier, W. S. Spgs., W. Va. / 65 4 203, Huntington, W. Va.
* Hawk's Nest, W. Va., 60 4 { 133 Greenbrier, W. S. Spgs., W. Va. / 203 Huntington, W. Va.
* Meadow Creek, W. Va. { 50 3 133 Greenbrier, W. S. Spgs., W. Va. / 65 4 203 Huntington, W. Va.
* McKinderee, W. Va.. { 50 3 133 Greenbrier, W. S. Spgs., W. Va. / 65 4 203 Huntington, W. Va.
* Ronceverte, W. Va.... { 35 2 133 Greenbrier, W. S. Spgs., W. Va. / 65 4 203 Huntington, W. Va.
* Sewell, W. Va..... { 60 4 133 Greenbrier, W. S. Spgs., W. Va. / 65 4 203 Huntington, W. Va.
* Talcott, W. Va..... { 40 3 133 Greenbrier, W. S. Spgs., W. Va. / 65 4 203 Huntington, W Va.

CUBA CABLE BUSINESS.

The following should have been given in notice of Cuba Cable Rates and Rules, published in JOURNAL of December 15, 1872. An extra charge of three dollars gold should be added to the charge for each Cuba cable message, to pay charges for dispatch boat between Key West and Havana.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Jan. 22, 1873.

From and after Feb. 1st, *Marshalltown, Iowa*, in J. J. S. Wilson's District, will be closed as a money order office.

Hallville, Texas, in L. C. Baker's District, has been closed as a money order office.

G. H. MUMFORD, Vice Pres't.

EXECUTIVE OFFICE,
NEW YORK, January 31, 1873.

On and after March 1, 1873, money order offices will be established at the following points in G. T. Williams' district:

Cadiz, O.
Cambridge, O.
Huntingdon, W. Va.
Pomeroy, O.

G. H. MUMFORD, *Vice Pres't.*

TELEGRAPHERS' MUTUAL INSURANCE ASSOCIATION.

ACKNOWLEDGMENT OF NOS. 34, 35 AND 36.

15 22 237 302 420 447 627 632 659 931 1001 1048 1163 1187 1254 1267 1367 1407 1424 1446 1500 1582 1618 1627.

ANOTHER death is reported, that of Minah G. Chettle of Memphis. He joined last October, when in good health, was taken sick December 2d, and gradually grew worse until January 23d, when he died of consumption of the brain. This death, and that of R. S. Raymond of New London, will make another double call necessary.

NEW YORK, Jan. 24th.

FIRE ALARM TELEGRAPH.

The subject of providing Brooklyn with a perfect fire alarm telegraph system similar to that employed in New York, is now being agitated in official circles. The present system of fire alarm telegraph in Brooklyn cost only about $5,000, as connections were made with the police telegraph wires.

EXECUTIVE OFFICE
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, Jan. 23, 1873.

EXECUTIVE ORDER NO. 143.

Executive order No. 127 is hereby modified as follows: Upon presentation of a half-rate or red frank of this Company, the holder will be entitled to transmit messages, and receive answers thereto, upon payment of one-half the regular day rates. No rate to be less than twenty-five cents.

The franks do not cover collect messages which are not answers.

All messages sent under "Half-rate Franks" will be *checked at full rates*, and offices sending such messages will return them as "*uncollected*," entering in "uncollected" account the uncollected one-half of the tolls, and forwarding the messages with their monthly reports as vouchers.

WILLIAM ORTON, President.

THE TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ORGANIZED IN 1867.

The heirs of deceased members receive one dollar from each of the surviving members of the Ascociation.

All engaged in the Telegraphic service are eligible to membership, if in good health and of good character and habits. Initiation fee $1.50.

Blank forms of Application and Restoration may be had of the Secretary, or of any of the following Agents:—

Augusta, Ga.,.....J. M. Crowley.
Baltimore, Md.,.....Archd. Wilson.
Buffalo, N. Y.,.....J. W. Tillinghast.
Cincinnati, O.,.....F. A. Armstrong.
Chicago, Ill.,.....W. C. Long.
Cleveland, O.,.....H. L. Melton.
Clinton, Ia.,.....E. O. Wait.
Erie, Pa.,.....G. W. Baxter.
Erie R'y Telegraph,...W. J. Holmes.
Harrisburg, Pa.,.....H. A. Clute.
Indianapolis, Ind.,.....D. C. Hinsdale.
Mobile, Ala.,.....Wm. Sandford.
Memphis, Tenn.,.....J. J. Fowler.
Milwaukee, Wis.,.....D. H. Henshaw.
New Orleans, La.,.....Jas. T. Alleyn.
Nashville, Tenn.,.....E. C. Boyle.
Philadelphia,.....Jas. Merrihew.
Phillipsburg, N. J.,.....John Fuller.
Pittsburg, Pa.,.....S. L. Gilson.
Richmond, Va.,.....R. M. J. Paynter.
Syracuse, N. Y.,.....D. L. Pike.
St. Louis, Mo.,.....J. P. Cassidy.
San Francisco,.....J. S. Urquhart.
Seattle, Wash. Ter.,...F. H. Lamb.
Springfield, Mass.,.....W. J. Denver.
Toronto, Ont.,.....A. Hunter.*
Washington, D. C.,.....M. Marean.
White River Junc., Vt.,G. W. Gates.

Additional Agents wtll be appointed as soon as practicable.

Applications for membership should be endorsed by the Agent through whom they are made.

Members in communicating with the Secretary will always state the Number of their Certificate.

A. S. BROWN, Treas.
D. R. DOWNER, Secy.

* A. Hunter is Agent for all of Canada.

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INTERNAL ARRANGEMENT OF THE BRITISH POSTAL TELEGRAPH SYSTEM.

We have been favored by Superintendent D. H. Bates with the following extracts from letters received by him from Mr. H. Blanchford, of the Engineers' Department, Southern Division, of the British Postal Telegraph service. These extracts portray, in some degree, the working of the English system in special emergencies, affording, however, no new ideas, as the arrangements are very similar to those employed in our own service in analagous cases. In place of any comments we might have made upon the statement of the average delay allowed upon each message—five minutes, where the circuit is direct, and ten where the message has to undergo one repetition, we present the editorial article in the first number of the *Telegraphic Journal*, a new London monthly, which appeared November 15, 1872. As speedy transmission is among the points of excellence, especially claimed by the British Postal service, and the time allowed for delays is regulated officially, it becomes of interest to see in what manner governmental service is superior to that of private companies.

The information presented in Mr. Blanchford's letters of the inner working of the system in England will be particularly interesting to American telegraphists, who, with but few exceptions, have had but little knowledge of the manner in which the operating service was conducted in the only country where the business, in point of magnitude, resembles that of our own.

Mr. Blanchford writes:

Your favor of July 2d reached me about three weeks after that date, and would have been acknowledged earlier but for the intervention of a series of "special arrangements," consequent upon the visit of the Prince of Wales to some watering places in my section, and later to the necessity for providing facilities for the despatch of the increased private and press work arising out of the Autumn manœuvres which have also taken place within my section.

Touching these, you may be interested to learn that 14,000 additional private messages and 600,000 words of press work were disposed of in the district over which the troops manœuvered.

"Special arrangements" are not, as a rule, very remunerative, but they are encouraged, as testing the elasticity of our system and its adaptability to any circumstances. For example, Salisbury, a small town in Wiltshire, where the Commander-in-Chief established his head-quarters, has, for general purposes, the part use of a wire to London, and of another wire to Southampton, but by diverting a portion of the work of some other towns, we were able to provide four *clear* London wires during the daytime, and at night, when many of our wires are "suspended"—*i. e.*, are not used—ten press circuits were brought into use.

With us, Inspectors occupy the third grade in the Engineers' branch. First come the Divisional Engineers, followed by Superintendents and Inspectors.

No Inspector, however, can hope to succeed, or to give satisfaction, unless he is thoroughly conversant with every detail of the commercial working. He must be able to judge as to the capacity of a wire, and, in cases of complaints of delay from insufficient wire accommodation, which are often made by postmasters and clerks in charge, should be able to decide whether more wires are required, or whether the delay can be prevented by improved manipulation.

The delay allowed for each transmission of a message of ordinary length is five minutes.

Thus, a message from Southampton to London (sent upon a direct wire) should occupy but five minutes in transit, irrespective of delivery; while for a message from a small office, for which Southampton transmits, ten minutes are allowed for a message to reach London, and the result is that our maximum delay is something under half an hour.

In another communication he says:

The figures quoted in your last favor indicate that there is no want of enterprise in the administration of the telegraph on your side of the Atlantic.

I should have added, with reference to the messages and press work dealt with during the Autumn manœuvres, that the business was transacted at small, isolated places, where, usually, press work is unheard of, and the number of ordinary messages is so trifling as hardly to make the offices remunerative.

So well provided are our principal offices, that, with a few hours' notice, we can guarantee the dispatch of any quantity of matter. For example, at Exeter, on October the 24th, 21,000 words were sent off without delay or inconvenience, between the hours of 9 P. M. and 2 A. M., four wires being used, two fitted with Wheatstone's automatic apparatus, and two with ordinary keys. This was quite exclusive of the news *received*, which is heavy, considering the small size of the town, and would amount to another 20,000 words daily. Upon the occasion referred to, the Attorney-General had been giving an account of his stewardship during the last session of Parliament, and some of the leading journals obtained special reports by wire.

In our central office, Telegraph street, London, a gallery is set apart for the general press work, *i. e.*, that supplied by contract, or otherwise, by the associations to the newspapers, rooms, clubs, &c. In this gallery are a number of "Wheatstones" (fourteen or sixteen), from which news is sent during eighteen or twenty hours daily to the chief towns or "centres," whence it is distributed by means of local circuits to the smaller towns.

I am not in a position to state the exact amount of press work thus dealt with, but it cannot be less than 200,000 words daily during the sitting of Parliament, as the average speed upon the press wires is about sixty words per minute, and not unfrequently the number of wires has to be augmented. Independent reports of any special occurrences are disposed of upon commercial wires, the nominal business being diverted *pro tem.*

The price charged for this description of work is very low. Between the hours of 7 A. M. and 7 P. M. seventy-five words can be sent for one shilling. If to more than one address, two-pence is charged for each extra copy. From 7 P. M. to 7 A. M. one hundred words can be sent at the same price and upon the same terms. No further reduction is made, whatever the length of the message may be. Thus, 2,000 words to two addresses would cost £1 3*s.* 4*d.*

The employment of Wheatstone's automatic arrangement increases three-fold the capacity of a wire. This is the only gain, as rather more staff is required than if the work were keyed upon separate wires. Generally speaking, clerks are easier to be obtained than additional wires, and, in cases of pressure, the speed is maintained for hours at one hundred words per minute, four clerks being usually kept at the receiving instrument.

GOVERNMENT TELEGRAPHY.

From The Telegraphic Journal (London, Nov. 15, 1872).

The purchase of our telegraphic system by the State is in theory a matter of congratulation for the public, and we even look forward to the railways being bought up in the same manner. We say in theory, because in England the principle obtains that what belongs to the Government belongs to the people. But, unfortunately, in the case of the telegraph, it is too much in theory and too little in fact that we derive benefit from the change which we expected would prove to be so advantageous. We can certainly send messages at a cheaper rate, and we are given to understand that the use of this means of communication has greatly extended under the new *regime*. So far so good; but we hear complaints around us that the main advantage of telegraphic messages, namely, their speed of transmission, is, to a great extent, denied us. The electric force, in deed, appears to be as willing and as quick as ever; but, for reasons best known in Telegraph street, the length of time taken to transmit a given message is too often reckoned in hours instead of minutes. In the present state of things a case such as this is possible: A, in London, intends to call on B, who is about 50 miles away. Regardless of expense, A "flashes" a message to B to notify his intention. He leaves by the next train, arrives at his destination, and finds, much to his own astonishment, that he takes B by surprise. An explanation ensues, during which the tardy message arrives recording an intention that has become an act. Something of the sort has come within the writer's own experience.

Before the invention of the electric telegraph the natural and obvious difficulty for the transmission of messages at a speed as rapid as that for which the wire offers such facilities would be to find the practical means. These practical means are provided by science. The difficulty is then surmounted? Not so; there is now another to be overcome, by no means a natural or an obvious difficulty; in fact, a very artificial difficulty; a difficulty created by ourselves, or which we allow others to create for us—it is red tape. The precious moments which are supposed to be gained by "flashing" the message from place to place are allowed to be lost many times over because the telegram must wait on a table for a clerk to sign it. Thus the advantage to be derived from "flashing" becomes in many instances purely imaginary, and if it were not for this sentiment we might often as well have written by post. That is cheaper, more confidential, and a word or two more makes no difference in the price.

Need all this be? Is it absolutely essential that the messages should be allowed such lengthy breathing times out of consideration for the speed at which they travel? It is urged that if we will send to a crowded wire our messages must wait their turns. But why should the wire be crowded? Why not tell us when it is full? Why receive more work than can well be got through? Speed is the very essential of the telegram; it is its *raison d'être;* therefore there is no good in reducing the charge for this convenience if the convenience itself vanishes. It becomes in fact much more expensive. We now pay a shilling for a telegram when a penny stamp or even a halfpenny card would have sufficed. In former days a telegram was an outlay, certainly, but we paid much for a speed that we obtained. Many would still pay as much for the same advantage, but find they pay a reduction for a ghost of it. With many a business man the rapid acquisition or transmission of information directly and enormously affects his worldly interests; and it is such men who are among the best customers of the wire, but who are sacrificed for the apparent good of the more general public.

Now, we are not opposed to the government possession of the telegraphic system; we say in theory it is preferable to the possession by private companies; but we see no reason why we should not derive actual benefit from the change. That we do *not* derive actual benefit will, we think, be felt by at at least the majority of those who daily use the wire. It appears to us that the evil is not by any means necessary. We speak, however, in considerable ignorance, for so reserved are the authorities of this department as to their arrangements, and so averse to our seeking any useful information on that point, that we cannot prescribe the exact remedy for the evil. But we may bear this in mind; that all the real and practical difficulties would lie in the science of the matter; *i. e.*, in the instruments employed; that the post-office has the very best instruments at its service. The speed is a marvellous triumph of science, the delay is a created obstruction of routine.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, FEBRUARY 1, 1873.

THE General Superintendents of the Western Union Company are requested to communicate with their assistants and each other with a view of arranging uniform hours for Sunday service.

MANAGERS are requested to observe, particularly and carefully, that clause in the Tariff Circular, concerning the rates to be collected upon all messages received collect from certain points on the Pacific coast.

MANAGERS in returning upon their monthly (No. 4) report, the receipts for, and the number sent of full rate and half rate messages, should consider as "full rate" all messages booked as such, whether one-half of tolls are uncollectible on account of "red" franks, or not; and should consider as "half rate," only night messages booked at half rates.

GREAT REDUCTION OF RATES.

Once more a radical and sweeping reduction in rates is announced by the Western Union Telegraph Company.

On and after February 1, 1873, all rates between stations upon the lines of the Company, where they exceed two dollars and fifty cents for ten words, will be reduced to that sum. Heretofore the maximum rate has been six dollars. Upon messages sent collect, however, originating at certain points upon the Pacific Coast, where specie is the standard medium of exchange, and sent to any part of the country where the standard currency is paper, there will be an additional charge of twenty-five cents for ten words and one cent for each additional word. This is intended to protect the Company from the loss occasioned by the difference in value of the depreciated currency and also to partly compensate for the trouble in collecting the money. This extra charge is only upon business originating at the points specified and passing in the direction indicated.

The public will doubtless appreciate this additional evidence, that the policy of the Company now, as in the past, is to keep the rates only at a paying standard, and that as rapidly as the increase of business will warrant, just so soon will the rates be reduced. This fact, however, has never been called into question by those whose necessities compel them to use the telegraph.

THE American District Telegraph Company advertise this week for good line men.

GOLD MEDAL OF HONOR AWARDED TO JOSEPH B. STEARNS.

The American Institute has awarded to Joseph B. Stearns the Institute Gold Medal of Honor for his great invention of the Duplex Telegraph. The honor of this award, so justly bestowed upon Mr. Stearns, will be duly appreciated by all who are acquainted with the pre-eminently high position of the American Institute, and also from the fact that only one Institute Gold Medal of Honor is awarded during the year, and none, unless for an invention of paramount importance.

MR. GEORGE B. PRESCOTT, Electrician of the Western Union Telegraph Company, and Gen. Thomas T. Eckert, General Superintendent of the Eastern Division, have been commissioned to visit Europe, to examine the latest improvements in the telegraphic service there. They will give especial attention to the employment of pneumatic tubes, which are being used in London and other places, in connection with the telegraphs for the transmission of messages between the offices in the large cities, and also thoroughly examine the system of underground lines.

The Western Union Telegraph Company has, for the past seven years, been striving by the improvement of its lines and machinery, and by the employment of the most skillful operators, to secure the most prompt and satisfactory telegraphic service in the world, and we believe the results satisfactorily show that it has fully succeeded. Any improvements, however, in any branch of the telegraphic service which may be found to exist on the other side of the Atlantic, will be promptly introduced upon the lines of the Western Union Company.

Messrs. Prescott and Eckert will sail in the steamship "Parthia," of the Cunard line, on the 12th of February, and will probably be absent about two months.

Mr. J. B. Stearns also leaves on the same steamer for the purpose of introducing his Duplex Telegraph in Europe.

By authority of the Executive Committee of the Western Union Telegraph Company, Dr. Norvin Green, of Louisville, Ky., has been designated Acting Vice-President of the Company, to fill the vacancy occasioned by the resignation of Judge Palmer, which was recently announced in the JOURNAL.

Few men are better known in telegraph circles than Vice-President Green, who brings to the position he now occupies a ripe experience and familiarity with the details of the business which can not fail to materially advance and maintain the best interests of the Company. He has only resumed duties and responsibilities with which he has been long familiar, having probably an older experience in the management of Telegraph Companies than any other now in executive authority, commencing with the control and management of the New Orleans and Ohio Telegraph Lessees in 1854, and soon after President of the South-Western Telegraph Company, which in 1865, he stocked into the American Company, of which he was Vice-President until the grand consolidation in July of 1866, with the negotiation and settlement of which he was a leading actor. He has been a Director ever since the consolidation; and a Vice-President in active service up to the beginning of 1870, when he retired to take the Presidency of the Louisville, Cincinnati and Lexington Railroad Company. His railroad having been absorbed by one of the Great Eastern lines, the Executive Committee promptly availed of the opportunity to secure his return to take part in the onerous duties and responsibilities of the executive management of the Western Union Telegraph Company. He entered upon duty about the 20th of January.

TRICKS OF POSTAL TELEGRAPH ADVOCATES.

The *Daily National Republican*, whose editorial in answer to our criticisms upon the Postmaster-General's report we answered in our last issue, declines to publish our refutation of its incorrect statements, but instead pretends to produce extracts from our reply which sustain the position previously taken. We submit a few of these so-called extracts from our article, to show what kind of tricks the advocates of the postal telegraph resort to to sustain their cause. We quote from the *Republican*:

"The JOURNAL says 'dead-heads are properly included under paid messages because the Western Union Telegraph Company *paid for them*,' and then says, 'the *receipts* for these messages were included in the receipts for the transmission of messages.' This contradictory statement puzzled us, as we could not understand how a sum paid out could be a portion of the receipts."

Now, the following is exactly what we did say:

"The 660,203 partially paid and free messages were not all 'dead-heads,' as assumed in the *Republican's* calculations, *but were paid for at an average compensation, in cash, considerably greater than that derived by the company for the transmission of the Governmental weather reports.* The receipts for this class of messages were included in the receipts for the transmission of messages, so that there is no reason for excluding them from the number of messages sent in arriving at the average rate charged.

We said nothing about "dead heads being properly included under paid messages because the Western Union Telegraph Company paid for them," and the pretended quotation is a sheer fabrication, to which the inverted commas were added for the purpose of making it the more readily believed. We quote from the *Republican* again:

"The JOURNAL also says that we were, perhaps, correct in including so much of the receipts from other sources as was derived from the gold premium on cable dispatches, but as they do not tell us what portion came from other sources we cannot deduct any portion thereof."

This is what we did say: "The question whether the premium on gold, remaining in the company's hands after settling with the Cable Companies, should be regarded as forming a portion of the "receipts for the transmission of messages," might perhaps, be open to discussion, but, as the amount would only make a difference of a fraction of a cent in the average rate, it is scarcely worth considering. The dividends on stock owned by the company cannot, however, in any way, be construed into receipts for the transmission of messages."

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We will make but one more extract from the *Republican's* article, which reads much more like the lucubrations of the young man who manufactured statistics for the Postmaster-General's report, than the emanations of the editor of a respectable newspaper.

Says this *veracious* writer :

"In our estimate we did not deduct the receipts from market and weather reports, because the letter of the President of the Company to the Postmaster-General said that the paid, dead-head and press messages included everything but railroad and service messages."

The short answer to the above is, that it is not true. The President's letter to the Postmaster-General said nothing of the kind, as the readers of the *Republican* can easily ascertain by referring to the letter in question, published in the pamphlet entitled "The Relation of the Government to the Telegraph," copies of which can be had at the office of the Company in Washington.

The *Republican* says that the JOURNAL is wrong in deducting the amount paid other lines and uncollectible, from the receipts of the Western Union Company, as these sums were all paid by the public for the transmission of messages. This is absurd. How can an amount which is uncollected be an amount paid by anybody? And, if this Company receives a sum of money to be paid over to a connecting line, how can such sum be reckoned as a portion of the receipts of the Western Union Company? Such misrepresentation and petty quibbles are beneath criticism, and if the advocates of postal telegraphy have nothing better to rely upon, their cause is too weak to stand alone, and will topple over from its own imbecility.

Within the past few years the practice of making and receiving gifts, has become very prevalent among all grades of employés of the telegraph companies. This custom we regard as very objectionable, and its continuance must inevitably prove demoralizing.

We do not question the fact that the recipients of the gifts are entirely worthy of the esteem which the presentation of such tokens of regard indicate that the donors entertain for them, nor that those who give them do so from the best of motives, but the custom is one, nevertheless, which ought to be discountenanced, because it lays the motives of both parties open to suspicion. All who take part in these presentations doubtless do so from generous motives, but many cannot afford this manner of gratifying their feelings. To such the matter becomes a positive hardship. Let us consider this question from one of the various points, in which it may be viewed.

Some person in an office, or upon a line; having what is commonly termed, an ax to grind, sees his way clear by engineering a presentation to an official whose good will it is necessary to propitiate in order to carry out the design he has in view. Advantage is taken of the popularity of the official and the esteem felt toward him by his subordinates, which generous sentiment becomes, as it were, embodied in the person most active, thus placing the recipient under a personal obligation to the one who has, apparently, done so much to cause honor to be paid to him. It is, perhaps, too much to expect from the average official about to be complimented, that he would evince moral courage and self denial sufficient to discourage the movement ; or to decline the gift ; such evidences of appreciation are too valuable in the sight of human nature to allow of this course, yet several instances have occured within our own knowledge where high toned officers of the Western Union and other telegraph companies, when they became aware of a contemplated testimonial, sternly discountenanced the movement, and when matters had progressed so far that the articles to be presented were already procured, refused the proffered gift. The effect of this course was to strengthen the official and personal relations between the parties.

With regard to those who cannot afford the luxury of such indulgences, it is a fair inference that they subscribe toward a testimonial, either from a sentiment of pride, in not allowing themselves to be outdone by their fellows in a manifestation of this nature, or from an ignoble apprehension of the consequences in case of refusal. Of course, it is not to be supposed that this fear has any foundation in fact, but with many it certainly exists, and has its influence.

The good taste of these presentations is also questionable, and did no other cause exist, this alone should be sufficient to prevent such manifestations. We have no inclination or desire to set up a standard for good taste, but it must be evident, that to receive a present where no equivalent can be made, save at the expense of official trust, is not strictly in accordance with the ordinarily recognized standard of self respect.

Pecuniary embezzlement is not the only manner in which official trust may be abused. The relations existing between officer and subordinate, in order that the interests of their common employer should be maintained and advanced, should be based upon reciprocal sentiments of respect and esteem; but so surely are the inclinations and judgment of individuals warped, either by gratitude to those who give or by a quasi-resentment toward those refusing to give, if any such there be, that this condition is violated. The recipient of a gift under these circumstances, becomes necessarily under a moral obligation toward the donors, and this fact has a tendency to influence a state of loose discipline, injurious to the service.

Our remarks are not intended to be condemnatory, nor as a reflection upon the motives of any. In our great desire to elevate the service, we have simply endeavored to point out the demoralizing influences growing out of the custom of gift presentations, and thus to discourage as much as possible, a growing evil.

As a means tending to that end, the JOURNAL, henceforth, will not record these events, unless it be as a token of respect and esteem to one vacating office, or leaving the business, when no taint of suspicion can be attached to the motives of any. In such a case, the JOURNAL will gladly do its part in rendering honor to the deserving.

A TELEGRAPHIC Employment Bureau has been established at Toledo, Ohio, at the head of which are several well and favorably known Superintendents of Telegraph. An institution of this character is a novelty in the telegraphic business, and it is to be hoped that the merits of deserving telegraphers, who may wish to better their condition, may, by the means of this bureau, be brought to the notice of those who, while in need of such service, might otherwise have remained in ignorance of its existence. See our advertising columns.

IN another column of this paper, Messrs. L. G. Tillotson & Co., inform those of our readers who may be in need of goods in their line, that they are ready to supply them with all kinds of telegraph supplies of the best quality and manufacture. The Le Clanché battery is their new specialty.

NEW YORK, NEWFOUNDLAND AND LONDON TELEGRAPH CO.,
NEW YORK, 14th January, 1873.

CYRUS W. FIELD, Esq.:

Dear Sir : I have the pleasure to hand you the following copy of a preamble and resolutions which were unanimously passed at a meeting of the Board of Directors of this Company, held this day :

"WHEREAS, the principal office of this Company is to be transferred to London, and the present Directors, excepting Mr. Field, are about to retire from the places which they have filled for nearly nineteen years ; and

WHEREAS, during all these years Mr. Cyrus W. Field has been associated with them in the direction, and it is to him that the organization of this Company is mainly due ; and

WHEREAS, he has labored in its service with zeal and diligence hardly ever equaled, and with a success great even beyond our expectation ; therefore it is

Resolved, unanimously, That Mr. Field is entitled to the warmest thanks of the Directors and Stockholders of this Company for his extraordinary labors in their behalf, and none the less that in their performance he has won a reputation co-extensive with the civilized world.

Resolved, further, That a suitable service of plate be prepared at our individual expense, and presented to Mr. Field, as a testimonial of our esteem, and in recognition of his invaluable services to this Company."

I remain, dear sir, very resp'y, yours,
(Signed) E. F. HATFIELD, Jr.,
Sec'y.

NEW YORK, January 15th, 1873.

E. F. HATFIELD, Jr., Esq., Secretary of the New York, Newfoundland and London Telegraph Co.:

Dear Sir : I have the honor to acknowledge the receipt of your letter of the 14th inst., containing resolutions unanimously passed at the last meeting of the Board of Directors of the New York, Newfoundland, and London Telegraph Company.

For the generous appreciation of my labors in behalf of the Company, expressed in the resolutions, the Directors have my sincere and heartfelt thanks.

For a period of nearly nineteen years, I have been associated with them, and have always found them earnestly and cordially co-operating for the accomplishment of the enterprise of establishing telegraphic communication between the Old and New Worlds, originally resolved upon at my house, on 10th March, 1854, after four consecutive evenings of consultation.

Of our struggles and disappointments through many weary years I need not speak ; they are fresh in the recollection of us all. During all this period, the Directors, consisting of Messrs. Peter Cooper, Moses Taylor, Marshall O. Roberts and Wilson G. Hunt, labored with untiring zeal for the successful accomplishment of the enterprise, without compensation for their services.

Though my connection with them as Directors is severed, I shall never forget their uniform kindness to me through the whole period I have been associated with them. And that God may bless every one of them will ever be my earnest prayer.

I remain, dear sir,
Very truly your friend,
(Signed) CYRUS W. FIELD.

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GALVANIC BATTERIES.

(By the Rev. H. Highton, M.A.)

I shall not attempt to give any ultimate explanation of the phenomena of galvanism. It appears to me that it is true wisdom in science not to attempt to do more than to give an intelligent and comprehensive classification of the phenomena themselves. Deeper theories may sometimes be useful in suggesting experiments, if it be borne in mind that those theories must always be doubtful, and mere matters of guess, and at best, simply provisionary. Thus Maxwell has shown that the laws of hydraulics may be applied to electrical currents, though he cautiously and wisely guards us against supposing that it follows from this that there is any real electric fluid similar to ordinary fluids. It would have been well if other well-known scientific men had been content to follow his example. In the same way I should object to the assumption of any ultimate theory of galvanism, beyond the mere intelligent and classified expression of the laws of the phenomena.

In the kindred subject of heat, I think great injury has been done by asserting that it is "a mode of motion," which has introduced many wild and visionary ideas. If the word "motion" be meant simply as a translation of a Greek word, which includes nearly all kinds of change, and it also be meant that a change of temperature is a mode of motion in the ordinary English sense of the word, the assertion is, in a certain sense, true, but deceptive; if it be meant that simple heat, without change of temperature, is motion of any kind, this is not only extremely doubtful, but, I believe, absolutely untrue.* With regard to galvanism, then, I would merely say that it would appear that whenever there is a chemical there is also a galvanic action, which only requires proper arrangements to be made for exhibiting it.

Perhaps the simplest method of producing a galvanic current is by the formation or decomposition of water. That, if we have two plates of platinum, the surface of one of which is covered with a film of hydrogen, and the other with oxygen, on making a metalic connection between the two, a galvanic current passes, and the hydrogen and oxygen unite and form water. Conversely, if we take two metals, one of which has a greater affinity for oxygen than the other, and place them in water, then, on metallically connecting them, the water is separated into oxygen and hydrogen, the oxygen uniting with the more oxidisable metal, and the hydrogen being evolved on the surface of the other metal, and a galvanic current flows. I will show you both these actions by actual experiment. In both cases one pole of the battery is said to become positive and the other negative, and the action passing between the two is commonly called a galvanic current.

Take, again, the simplest of all forms of a galvanic battery—zinc and carbon, with a dialyte, as it is called, of dilute sulphuric acid between them; the oxygen of the water unites with the zinc, and forms oxide of zinc; the sulphuric acid unites with the oxide, and forms a sulphate of zinc, and hydrogen is evolved on the surface of the carbon. This double chemical action gives rather more electricity than the single action, as you see.

Now, it is a well-known fact that chemical combinations frequently produce heat, and it is also a well-known fact that an electrical current in passing through a homogenous conductor also produces heat; and it is an exceedingly interesting problem to ascertain what relation the heat of the chemical combination bears to the heat produced in the conductor of the current. An investigation of this kind requires the most delicate and expensive apparatus, much more delicate and expensive than I possess; but in searching into the records of the most trustworthy experimenters on this point, and comparing the results obtained by them, I have arrived at the following conclusions:

1. That, in all cases of galvanic action, the heat evolved in the battery, plus that in the exterior circuit, is exactly equal to the heat produced by the chemical action.

2. That, in most cases, a certain portion of that heat is retained exclusively in the battery, besides what is due to the internal resistence of the battery, and is not transmitted through the circuit.

3. That the potential of the battery varies, not only with the total chemical heat produced, but also with the proportion which that part of the heat which is transmitted through the circuit bears to the total chemical heat produced by the action of the elements of the battery. Indeed, the potential of a battery is exactly proportional to the amount of heat transmitted through the circuit by each unit of the atomic weight of the metal or other substance consumed or chemically changed. Thus, if we take two batteries, one of zinc, sulphuric acid or carbon, and another of zinc, sulphuric acid and copper, the heat evolved by the sulphoxidation of the zinc is the same in both cases; but the potential of the former, and consequently the heat evolved in the circuit, is greater;—what becomes of the difference? Is the heat in some mysterious way lost? No; the surplus heat is not evolved in the circuit at all, but remains in the liquid of the battery, useless for the production of electricity. Now, it is an exceedingly remarkable circumstance that the only battery yet examined in which the whole of the heat produced is transmitted throngh the circuit, is that form of the Daniell's battery in which zinc, in a solution of sulphate of zinc, is used for the positive, and copper, in a solution of sulphate of copper, for the negative, and in which the sulphuric acid and oxygen are transferred from the copper to the zinc.

With zinc, strong sulphuric acid, and platinum, about five-sixths of the heat produced is transmitted through the circuit, but this varies somewhat with the strength of the acid; with iron in sulphate of iron and copper in sulphate of copper, only about two-thirds are transmitted; with copper in nitrate of copper, and silver in nitrate of silver, about 39-82. In this way we account for the circumstance that, with the same positive metal, the potential varies with the character of the negative metal, less of the heat of the oxidation of the positive metal being transmitted through the circuit, and more retained in the battery itself. I may as well say that I obtained these results by comparing some well-known experiments of M. A. Favre, with some very important ones of M. Soret, which are scarcely known at all. I will illustrate this by showing you the amount of current derived from the oxidation of iron in conjunction with carbon, silver, and copper respectively.

But the whole subject of the relations between heat and electricity is one which requires deep and accurate investigation. M. Favre, in France, and Dr. Joule, in England, are the principal experimenters on this subject, and having spent very much time in carefully examining the published records of their experiments, I have no hesitation in saying that the conclusions they deduce cannot be accepted till they are repeated and varied with the most careful precautions, either by themselves or by others. It is much to be regretted that the committee of the British Association appointed three years since to investigate and report on the question in which these points are involved, and since re-appointed from year to year, have not yet made public a single syllable by way of report as to their proceedings or conclusions.

I will only make one observation more before I leave this part of my subject, and that is, that chemical actions which produce cold create a galvanic current, and therefore produce heat, as much as those actions which primarily produce heat. Thus, copper and carbon, acting on water, produce a current exactly the same in kind as zinc and carbon, although the heat produced by the oxidation of copper is less than the cold produced by the separation of the hydrogen and oxygen of the water. Again, you will see that while the combination of sulphuric acid with water, which produces heat, produces a galvanic current, the combination of acetic acid and water, which produces cold instead of heat, produces also a galvanic current of exactly the same kind as the combination of the sulphuric acid and water. Let me then show you these facts by actual experiment. And I may note, by the way, that it is a curious circumstance that the combination of many acids and other substances with water, while they produce a contraction of volume, at the same time produce cold, not heat. In the combination of an alkali with an acid, which also produces much heat, you will see that a strong galvanic current is produced, and in this case the alkali, like the water in the former case, acts as the positive, and the acid as the negative. These circumstances, with many others, illustrate the fact that the view of heat as given in Tait's "Thermodynamics" and other better known treatises, namely, that there is a certain absolute zero of temperature, fixed at—272 C., where heat finally ceases to exist, (just as there is a certain absence of motion when a body is at rest), and that all heat above this point is equivalent to a certain amount of mechanical force, is a view utterly erroneous; that, on the contrary, any variation of temperature, either upward or downward, involves mechanical force, and that the true zero of temperature is, when all contiguous bodies are of equal temperature, just as the true electrical zero is when all contiguous bodies are of an equal medium of electrical tension

But I now turn to the more practical view of the subject. And here let me begin by saying that, in order to understand practically the action of a battery, the most essential thing of all is thoroughly to understand what is called Ohm's law. I have no hesitation in saying that the discovery of Ohm's law was to electricity not a whit less important, indeed, I should say more important, than Newton's law of gravitation in astronomy and general physics; in fact, it has been like the rising of the sun to travelers groping their way in darkness. It is now, of course, universally acknowledged as the great law of electrical action, though, I need hardly say, that when first announced, it was received by the scientific men of the day with the utmost scorn, and actually denounced as the wild ravings of a madman. But Ohm was then an unknown man—now his name is a household word with all electricians. This great law then is, that the quantity of electricity passing through each part of a circuit in a given time is proportional directly to what is called the potential or electro-motive power of the elements, and inversely to the total resistance of the circuit. Thus, to express it algebraically,

(To be continued.)

* Aristotle, in his "Physics," suggests an important principle which might with advantage be studied by our modern theorists on the subject of heat. He says ("Physics" V., 1, 5.) "But perhaps whiteness is not a mode of motion, but whitening is;" so by analogy heat and cold are not modes of motion, but heating and cooling are so—that is in the Aristotelian sense of the word.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY,

November, 1872.

APPOINTMENTS.

Barry, J. J.....Sixth Ave. and 43d St.
Crawford, Fannie M.....145 Broadway.
Emery, Mary E..... "
Flynn, Thos. F..... .....Stewart's.
Fullman, E. J.....145 Broadway.
Garthan, J. J.....21 Wall St.
Goodell, Alice M.....145 Broadway.
Gordon, E..... "
Kavanagh, J. P..... "
LeMoine, F. T..... "
Mixer, C. L..... "
Morris, G..... "
Nye, Lizzie R..... "
Parr, C. H..... "
Thomas, C. H..... "
Wallace, Susie A..... .....Worth and Broadway.
Ward, G..... ..145 Broadway.
McKenzie, F. A.....Iron Mines, N. S.
Hadley, L. C.....Port Mulgrave, N. S.
Johnston, Jas. P.....Shelburne, "
Wilson, J. R. C..... .....Enniskillen, N. B.
Buchanan, J. H..... McAdam, "
Miles, Wm. B..... .....Westfield, "
Cummings, J. H..... .....Bellows Falls, Vt.
Mitchell, G. L.....Bradford, N. H.
Sweatt, Frank P.....Methuen, Mass.
Cheever, C. N.....St. Johnsbury, Vt.
Atwood, J. W..... .....West Randolph, N. H.
Woodworth, A. W..... ....Enosburgh Falls, Vt.
Taylor, C. T..... .....Bethel, Ct.
Mitchell, P. J.....E. Greenwich, R. I.
Swan, Frank H..... ...Fall River, Mass.
Colyer, Miss F.....Middletown, Conn.
Sheehan, Paul.....New Haven, "
Smith, George.....Norwich, "
Sawyer, W. A.....Plainville, "
Doolittle, F. B.....Wallingford, "
Hinckley, Miss Ida M.....Wood's Hole, Mass.
Prescott, George.....Troy, N. Y.
Gardner, A. D.....Millenville, N. Y.
Bateman, Miss Viola.....Dobbs' Ferry, N. Y.
Doughty, Wm..... .....Clinton, "
Crombie, W. C.....Phœnix, "
Everts, E.....Rochester, "
Golden, F. W.....Binghampton, "
Stagg, C. E.....Elmira, "
Sedgwick, W. F.....Council Bluffs, Ia.
Delano, E. P.....Peoria, Ill.
Cline, A. M.....Pekin, "
Stone, E. D. S..... .....Chicago, Ill.
Howe, E. R..... " "
Dyer, H. E..... " "
Todd, E. E.....Fort Scott, Kas.
Farley, Frank W.....St. Joseph, Mo.
Drake, Albert G.....St. Louis, "
Eckert, T. McK..... " "
McClintock, J. F.....Bryan, Wy. Terr.
Pearson, E. L.....Corrinne, Utah.
Knight, F. B.....Omaha, Neb.
Barker, A. C..... " "
Slater, Geo. R..... .....Dixmont, Pa.
Grins, A.....Freedom, "
Smiley, A. W.....Karns City, Pa.
Iron, J. F.....Millerstown, "
Wright, W. C.....Pioneer, "
Stough, C. R.....Pittsburgh, "
Orr, Harry..... " "
Ogden, Marion .... " "
Clark, T. C.....Canal Dover, O.
Crawford, F.....Caseville, Mich.
Felton, M. R .....Duncan City, Mich.
Perrine, W. J..... .....E. Saginaw, "
Emerson, R. S.....Fort Wayne, Ind.
Carpenter, C. B ..... " "
Wherritt, John.....Arcadia, "
Howlett, C. N..... .....Lafayette, "
Moore, J. O.....Logansport, "
Buchanan, W. C.....Zanesville, O.
Cleary, M.....Cincinnati, O.
Fellows, W. M..... " "
Kinkard, B..... " "
Morse, G. O..... " "
Spencer, J. M..... ... " "
Warren, H. V..... " "
Clark, L. E.....Garysburg, N. C.
Jarratts, B. B..... .....Jarratts, Va.
Carpenter, C. F.....Millboro, "
Lee, N. A.....Rockingham, N. C.
Johnson, C. S.....Chattanooga, Tenn.
Moseley, M. S..... .....Marion, Va.
North, J. Wilkes.....Aiken, S. C.
Tebeau, E. P..... .....Americus, Ga.
Rust, T. C .....Berzelia, "
Butterfield, L. H.....Charleston, S. C.
Trimble, W. R..... ...Cave Springs, Ga.
Franklin, C. R.....Cunningham, Ala.
Culverhouse, Geo. W.....Elmore, "
Worden, J. M.....Jacksonville, "
Brannon, H. F.....Monteville, "
Stewart, T. C.....Mobile, "
Mills, G. D..... " "
Murray, K. C.....Rome, Ga.
Berryman, S. R.....Shubuta, Miss.
Rose, T. S..... .....State Line, Miss.
Williams, F.....Whistler, Ala.
Boyd, D. J.....Pelham, "
Mitchell, F. W.....Amite City, La.
Huber, George..... ....Mauchac, "
Toney, J. T.....Vaideu, Miss.
Hill, W. M.....Burnsville, Miss.
Kendall, M. T.....Oakland, "
Wheeler, E. W.....Rutherford, Tenn.
Mahan, S. F.....Gamer, Miss.
Sanders, J. L.....Carlisle, Ky.
McDaniel, C. A..... .....Bremond, Tex.
Lee, Jno. H..... .....Brenham, "
Chilton, J. C.....Clear Creek, Tex.
Booth, C. W.....Oakwoods, "
McCormick, P.....Spring, "
Mow, J. C..... ....Troupe, "
Sinclair, Alex.....McKinney, "
Lines, H. F.....New Orleans.
Smith, C. H..... "
Curtiss, G. H..... "
Haifleigh, A..... .... . "
Hatch, A. L.....San Francisco, Cal.
Kenny, B..... .....Pioche, Nev.

RESIGNATIONS.

Burroughs, C. E.....145 Broadway.
Ford, Julia M..... ...Yorkville.
Golden, F. W.....145 Broadway.
Harrington, Hattie M..... "
Hurley, J. E..... "
McDonald, J. B..... "
Smith, F. H.....Canal St.
Seeley, P. E.....Enniskillen, N. B.
Hoben, C. F.....McAdam, "
Johnson, O.....Westfield, "
Barngest, W. C.....Iron Mines, N. S.
Hadley, R.....Port Mulgrave, N. S.
McGill, Geo. S.....Shelburne, "
Turner, O. G.....Augusta, Me.
Leet, Geo. W.....Bellows Falls, Vt.
Russell, J. E.....Bradford, N. H.
Eastman, E. E.....Lyndonville, Vt.
Parker, Jas. O.....Methuen, Mass.
Bingham, C. C.....St. Johnsbury, Vt.
Stoughton, H. R.....West Randolph, N. H.
Clark, H.....Enosburgh Falls, Vt.
Ludington, H. P.....Hartford, Conn.
Goodell, Alice M.....Middletown, Conn.
Hatch, H. S..... .....Newport, R. I.
Norton, Byron M..... .....Plainville, Conn.
Rice, J. M.....Wallingford, "
Hinckley, Miss R. L.....Wood's Hole, Mass.
Capen, W. J.....Worcester, "
Gledden, F. W.....Boston, "
Stewart, G. F..... " "
Locke, A. J.....Troy, N. Y.
Tibbals, Miss E.....Garrisons, N. Y.
Woodworth, Chas. G.....Auburn, "
Enin, Jos. F..... .....Clinton, "
Latz, A. H.....Niagara Falls, N. Y.
Lyttle, H. G..... .....Phœnix, "
Smith, H. W.....Rochester, "
Hurlburt, C. S.....Utica, "
Brick, Morris.....Binghampton, "
Gainsey, F. W.....Elmira, "
Reed, W. L.....Council Bluffs, Ia.
Porter, E P.....Chicago, Ill.
Valentine, A. M..... " "
Mason, S. C..... " "
Wallace, Wm., Jr..... " "
Sargent, W. D..... " "
Smith, L. M..... .... " "
Carroll, G. S..... " "
Stevenson, E. J..... " "
Griswold, H. C..... " "
Etter, Wm..... " "
Walker, J. D..... ..... " "
Todd, E. L.....Fort Scott, Ks.
Hill, S. W.....Hannibal, Mo.
Dugan, T. H..... .....Lincoln, Neb.
Fish, John M.....St. Joseph, Mo.
Shive, Jacob F..... .....St. Louis, "
Hart, M. C..... " "
Warren, Henry V..... " "
Unwin, J. W.....Omaha, Neb.
Moses, J. N..... .....Laramie City, Wy. T.
Hevina, Chas. L.....Freedom, Pa.
Kinney, S. C.....Pioneer, "
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 6. NEW YORK, FEBRUARY 15, 1873. WHOLE NO. 127.

THE CONDENSER.

The Condenser is an apparatus, by means of which a large quantity of electricity can be gathered on a small surface. Its form may be greatly varied, but the essential parts consist of two good conductors, which are separated from each other at a small distance by a non-conductor.

For the conductors there are ordinarily taken two metallic plates, A B C D. (fig. 1) between which, as a non-conductor, there is a stratum of air, or still better, a glass, caoutchouc or gutta-percha plate E F. When one of the metallic plates, A B, is connected with an electric body R, such for example as the positive conductor of an electrical machine, or some other source of electricity, and the other plate C D, by means of a wire, with the ground, then the + E of R is communicated to the plate A B. If the plate C D were not there, the quantity of electrity on A B would depend on the amount of surface of A B, and the tension of the prime conductor R. But the presence of the plate C D alters the case most

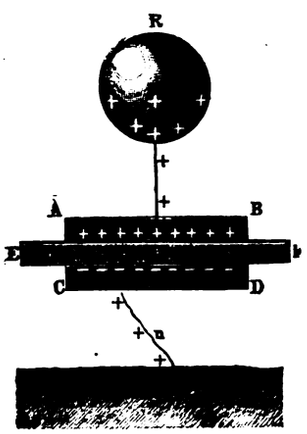


Fig. 1.

essentially. In the first place the electricity of A B cannot communicate with plate C D, owing to the interposition of the non-conductor E F. Consequently, the electric influence enters in exactly as in the case of static induction described in our last issue. The + E of plate A B analyses in the first place the plate beneath, attracts the—E, and repels the + E through n into the earth. But at the same time the — E of the plate C D is *bound* by the + E of plate A B; and the + E of the upper plate is also bound by the — E of the under plate.

Plate A B being at some distance from plate C D, the entire quantity of + E, which is present at A B, cannot hold bound an equal quantity of — E. The nearer both plates are brought towards each other the more — E can be bound by the + E of plate A B. For the same reason the bound — E of the under plate C D cannot bind an equal portion of + E of the upper plate, so that of the + E on plate A B, only a part is bound, and the other part is free. The bound + E on A B being so situated, as if it were not present at all at A B, is therefore called *latent* electricity, and thus it is only the smaller part of the free electricity of this plate which determines the electric tension. This tension, after the first passage of the + E from R to A B, is far less than it is at R, and thus a fresh quantity + E can pass on A B. However, almost the same thing occurs now that happened at the passing over of the first quantity of electricity from R on A B, namely, as at the very beginning the + E passed through n into earth, it becomes neutralized with an equal quantity — E from the ground, so that immediatcly on the first influence

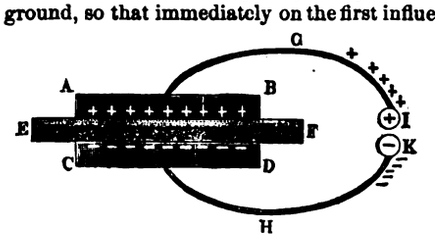


Fig. 2.

the derivation-wire n, as well as the plate C D and the bound — E, could supply the latter with fresh + E.

This + E becomes analyzed by the second + E, passing from R on A B; the — E of the under plate again becomes bound, and binds backward a part of the + E flowing from R, by which again a part of the latter remains free, and the electric tension on A B increases.

This process is constantly repeated until the tension on A B is the same as on R; when this is obtained, no electricity can pass from R to A B; at that time at A B a large quantity, comparatively speaking, of + E has gathered, and on C D likewise a correspondent but smaller quantity — E; of the former the greater part is bound by the — E of the plate C D, and even the latter is constantly bound by the + E of the plate A B. When this condition is entered upon, the condenser is charged.

When now the connection with R and the earth is broken, then at A B is present free + E and bound + E, the latter evidently in a state of heavy condensation, the under plate contains bound and con-

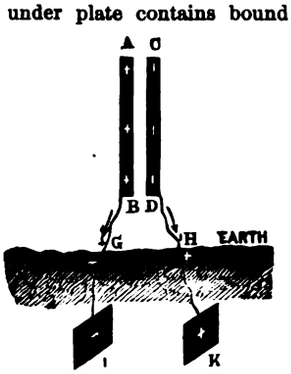


Fig. 3.

densed—E. Both bound electricities are attracted in an opposite way towards both surfaces of the non-conductor E F, and this attraction is so strong, that the electricities penetrate to a certain depth into the non-conductor E F.

When the source of electricity R is able to supply at each moment an infinite or exceedingly large quantity of electricity, its electric tension in charging the condenser does not decrease, and this charging follows almost immediately. When this is not the case, and the electricity is only produced by degrees at R, as in the electrical machine,—the condenser also only becomes charged by degrees, and the more rapidly, as the electricity on R is more rapidly developed.

When the charge has taken place, plate C D can be touched with the hand, without changing the condition of the charge, the — E of this plate being constantly bound, and consequently not able to be diverted. However, when the upper plate A B is touched, then, in the first place, the free + E of this plate is lead off to earth. The — E of the *under* plate, to whose binding as well the bound + E of the upper plate, as also the free + E of this plate is required, is kept only by the bound + E of the plate A B, and consequently cannot be kept constantly bound any longer; a part of this — E thus becomes free, and the rest remains bound. At present all + E on A B is bound; on the contrary all the — E on C D is partly bound, partly free.

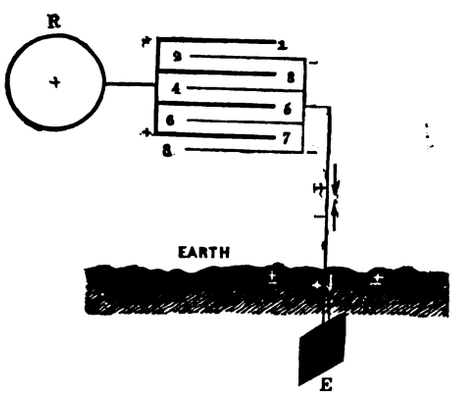


Fig. 4.

Now, if the under plate is again touched, the free — E becomes diverted; but even by this again a part of the + E on A B becomes free, — against which now all — E on C D is bound. Touching A B again, only the + E, which becomes free last of all, is diverted, by which again at C D a part of the — E becomes free.

When we continue in this way to connect plate A B and C D, one after another separately, with the earth, then the condenser becomes discharged by degrees. On the contrary, when the condenser, having been charged, and its connection with the source of electricity and the ground is broken, and its two conductors, G and H, figure 2, are connected with the plates A B and C D, and these conductors are brought near to each other by their extreme ends, I and K, then in the first place a portion of the free + E passes from A B to G; now all the — E cannot remain any longer bound on C D, a part thereof, consequently, becomes free

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and proceeds to H. But the result of this is that the primitive quantity of the + E can not remain bound on A B any longer, but that rather a part of the + E which was bound heretofore becomes free at A B, and passes at G, and, as in consequence hereof, again a part — E, at C D, becomes free, and passes to H, accordingly at G I free + E, and at H K free — E is collected. The charge of the condenser plates decreases somewhat in consequence here of, and the tension of the opposite electricities at I and K becomes the stronger, the nearer the extreme ends I and K approach each other. When this tension has become considerable enough, in consequence of a nearer approach of I and K to overcome the resistance of the stratum of air, located between I and K' then both electricities become combined, and an electric spark is seen between I and K. Both electricities which were gathered at A B and C D, now unite through G and H, with almost inconceivable rapidity, so that between I and K only a single spark occurs, and the condenser is discharged at once.

When, instead of both conductors G and H, we take only one conductor, for instance, G, and lengthen this so far, that the extreme end I is near to the plate C D, then we obtain almost identically the same result. The same occurs when both plates A B and C D are connected by wires with the earth. In this case, a portion of the free + E of plate A B, figure 3, as heretofore, passes through G to the earth I; analyze there, however, the + E of the earth, and equalizes with the — E; by this process a correspondent part — E of the plate C D becomes free, the same passes over H to K towards the earth, and and there recombines with + E of the earth. In this manner, as we have explained heretofore, both electricities + E and — E of the plates, go to earth, and the condenser is discharged. In this case, it is usual to say that the electricities of the condenser flow off to earth, or the earth acting as a very large reservoir takes up or absorbs both electricities, but we ought instead to look upon the discharging not as a disappearing of the electricities out of the condenser into the earth, but as an equalization of its electricities with the opposite electricities of the earth. After the discharge, both plates A B, C D are not entirely devoid of electricity, as would be the case with a reservoir, when the latter had poured out its contents, but each plate is again saturated with a quantity of + E, adequate to the size of its surface. Upon a closer enquiry we find that the electricities are not gathered on the metallic plates A B and C D, but on both surfaces of the conductor E F, which are in contact with the metallic plates. When the condenser is charged, if plate C D, figure 1, is removed by means of an isolating handle, and the plate is examined, it will appear to be completely non-electrical; on the contrary, plate A B shows a small quantity of free electricity; when now these plates are separately touched and then again put together, as in figure 1, the condenser is found to be completely charged, and when discharged, produces a spark.

The electricities, however, not only adhere to the surface of the non-conductor E F, but they even penetrate, on account of their opposite attraction, to a certain depth into the surface of the non-conductor, and, when the non-conductor is very thin, they may unite again in its interior, and in this manner cause a discharge. Even this also is the reason why the condenser in discharging by means of both conductors G and H, figure 2, does not become completely discharged at once, but, after the first spark appearing between I and K, still remains slightly charged, and does not become discharged until I and K are again and again brought into contact.

The greatness of the charge of a condenser depends on the size of the surfaces of the non-conductor, with which the condenser plates are in contact, on the tension of the electricity in the body, which furnishes the charge, and on the distance of the metallic plates, or the dimension of the non-conductor, which is situated between them. If the electric tension in the body, which produces the charge, is small, then the metallic plates ought to be brought very near to each other; in such a case, the metallic plates are merely separated by a thin stratum of shell-lac, wherewith the surfaces of these plates, turned towards each other in juxta position, are covered.

The form of the condenser varies according to the end proposed with it. When a great deal of electricity is to be gathered with it, and the source of electricity is not large, not only the condensing metallic surfaces must be made very extended, but they should be placed very close to each other, without, however, coming in contact at any point. Sheets of thin glass or thin plates of mica or gutta-percha, covered on both sides within a short distance from the edge with tinfoil, are in many cases adapted to this end. When, however, the surface of the condenser is required to be so large that these contrivances will not suffice, leaves of thin paper, saturated with paraffin, and covered on both sides with tinfoil, must be used.

The leaves are then laid singly one upon another, like the pages of a book, and the tinfoil plates are connected together in two series, upper and under, each by themselves. In this manner two separate rows of metallic plates are formed, which stand very close to each other, but are separated by the non-conducting paraffin paper, and thus represent a large surface, without taking up much room.

Figure 4 represents such a condenser as is usually employed in operating the Stearn's Duplex Telegraph. The uneven numbers, 1, 3, 5, 7, indicate the four upper; the four even numbers, 2, 4, 6, 8, the four under tinfoil coatings of four paraffin leaves. When now one of the rows, for instance that of the upper tinfoil leaves, is connected with a source R of + E, and that of the under tinfoil leaves with the ground E, the condenser becomes charged in the manner above-described; the upper tinfoil leaves condense the + E; the under ones, the—E, and the collective quantity of electricity, gathering in the condenser may become very considerable, even with a feeble source of electricity R, if the latter flows a short time, provided a sufficiently large number of leaves are employed.

In the condenser employed by the Western Union Company for working long lines with the Duplex apparatus, condensers containing from fifty to one hundred leaves are used.

Origin of Electricity.—Dr. Louis Elsberg, of New York city, has communicated a new theory of the origin of electricity. According to this scientist, the number of vibrations executed by the molecules of an electrified body are between those of sound and heat, namely they exceed 38,000 a second, (at which point the cousciousness of sound ceases altogether), and are below 200 billions in a second.

Prof. Loomis's ærial telegraph whimsey is fair game for the newspaper wits, and it would be cruel to blame them for utilizing it. At the same time, there is a little danger in laughing too fast and too loudly at these crotchety scientific people. Mr. Anthony's remark in the Senate was suggestive, not to say sobering. "I never heard of a more absurd scheme in my life," he said,——"except the invention of Prof. Morse."—*Springfield Republican.*

GALVANIC BATTERIES.

(*Continued from page* 74.)

$$Q = \frac{E}{R'}$$

Again, the resistance of the circuit consists of two parts—the internal resistance of the battery, and the resistance of the rest of the circuit. Calling these R′ and R″, we have the equation,

$$Q = \frac{E}{R' + R'};$$

and in the practical comprehension of this equation, under the different circumstances to which it is applicable, consists the whole difference between a good and a bad electrician; everything as regards the relation between batteries, the work they have to do, and the cost of doing it, depends upon this equation. If we have many similar cells in a battery, say n cells, then the equation becomes

$$Q = \frac{n\,E}{n\,R' + R''}$$

Q represents the amount of chemical action going on in a given time in each cell, and if R″ be small, it is plain that, though with many cells we get many times the waste of zinc and other elements of the battery, we get no addition to the current; on the other hand, if R″ be large, we want a good many cells to produce the same current, and, in fact, as I said before, in the practical application of the equation to every varying case lies the whole art of the proper or improper use of a battery, and the art of using such batteries as are properly suited to the object desired to be attained.

It will be obvious, from what I have said, that the main points of merit in a battery are—

1st. A large potential, or electro-motive force.

2d. A small internal resistance, for where there is much internal resistance a large part of the power of the battery is wasted in itself, in overcoming—if I may so speak—its own friction. To these two points I may add two more, viz:—

3d. Constancy, or a power of keeping up an action nearly uniform.

4th. Permanency, or the power of working for a long time without attention or fresh making up of the battery.

When I say that the heat produced in a given time—and in some cases the magnetic power—is as the square of the quantity, and not simply as the quantity, you will see at once the great importance of having a large potential.

The two instruments I have here will serve to show the first three points in different batteries, namely, the potential, the internal resistance, and the constancy, for at least a short time. The permanency must, of course, be a matter of time to ascertain. The first instrument, a galvanometer with a large resistance, will, I think, show practically better than any other the potential of a battery. By either observing the degree of deflection with the same resistance, or the resistance through which the same degree of deflection is produced, we get a good practical idea of the potential of a battery. And this is really all we want; an exact theoretical determination is valueless, as it is always varying, more or less, from moment to moment.

I will now show you the practical potential of a large number of combinations. Let us take, as a convenient standard, zinc in sulphate of zinc, copper in sulphate of copper.

It is more convenient in practice, though a little larger than the British Association unit, which they call a "Volt," in which the negative is copper in nitrate of copper.

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You see the degree to which it attains; now, let us compare with this the following elements:—

Zinc, dilute sulphuric acid, platinum.
Do. do. carbon.
Do. do. silver.
Do. do. copper.
Do. dilute sulphuric (‖) † nitric acid, platinum, (or Grove's form).
Do. do. (‖) nitric acid, carbon (or Bunsen's form).
Do. a mixture of dilute sulphuric and chromic acids, and carbon, without a porous cell, as recommended by Roscoe and Bunsen.
Do. dilute sulphuric acid (‖) carbon and mixed sulphuric and chromic acids.

I add a little permanganate of potash to the negative, and you see the potential raised a little. Now I will show you some forms of my own.

Zinc, solution of potash (‖) carbon packed in a mixture of carbon, precipitated sulphur, peroxide and of manganese with dilute sulphuric acid.
Zinc, common salt (‖) -- do. do.

Next what is in most respects, I think, the most convenient and best, and cheapest in action (for the power produced) of all batteries:—

Zinc, common salt(‖) --carbon packed in granulated carbon, peroxide of manganese, with a mixture of sulphuric, nitric, and chromic acids.

The potential of the first of these then is, as you see, very high, much higher than a Grove or a Bunsen—indeed, nearly fifty per cent. higher. The second and third also considerably higher; the third is very constant, very enduring, and, from the peculiar chemical action of the materials, emits none of those poisonous nitrous fumes which have so seriously and permanently injured the health of many who have used the Grove or Bunsen batteries. Now, we will try the potential of iron instead of zinc; this, you see, is about three-fourths that of zinc, so that four cells of iron will be about equivalent to three of zinc. But as iron is about one-third the price of zinc, and is much less likely to be affected by local action, it would seem as if there was great advantage in using iron. But as every pound of iron consumed will take a little more acid and manganese than the zinc (that is, in the proportions of eight and seven), and the internal resistance of four cells will be more than that of three, there is, on the whole, probably not much economy in using iron. Here is another battery in which no acid is used, and in which the potential is as high, or nearly as high, as a Grove, and very constant in its action. It is zinc, solution of salt (‖), carbon, and the peroxide of manganese, with a mixed salt of sodium, tin, and mercury. For telegraphic purposes, where the use of acid is thought objectionable, I know no better form.

But instead of zinc or iron, or indeed any metal, we may use any oxidisable liquid, and collect the electricity derived from its oxidisation by means of a carbon plate. The cheapest, probably, of all is common salt; you see this gives a very fair potential, in fact, not very short of a Daniell. Again, take sulphate of protoxide of iron, a very cheap material, which may be kept in a state of protoxide by placing in it pyrites or other sulphide of iron, which is a material almost valueless. Cyanide of potassium, you will see, gives a good potential; also hyposulphite of soda, and sulphide of soda or potash. You will observe that the potential of this is very much greater than a Daniell, and approaches that of a Grove. Sulphide of calcium—a waste material in many places—gives a very good potential. Again, brandy and water, sugar and water, milk, flour and water, all of which, being oxidised by the oxidising materials of the negative side of the battery, produce a considerable galvanic current. Indeed, with these kinds of materials the battery plays the same part as the stomach and lungs of the animal body, the negative part of the battery supplying oxygen to oxidise the food materials of the positive part just as the lungs furnish oxygen for oxidising the food supplied to the stomach and brought into circulation in the blood. You will observe that milk and tea are more easily acted on, and give a larger potential, than brandy and water or flour and water. But before I conclude this part of my subject I ought to show you the potential of some other forms of battery, namely, the Wollaston, the Smee, and the Le Clanché. You will see they are much inferior to some of the forms I have shown you, besides having other disadvantages which I shall show you in due time.

Well, let me next show you the internal resistance and constancy of some of the common forms of battery. In order to show this properly, we must, of course, take elements of an equal size. This instrument is a galvanometer of very small internal resistance, so that, practically, it shows you what is the internal resistance of the battery, as that is the main element of resistance. Of course the potential also affects the result, so that the degrees in this instrument will practically show you the combined result of potential and small resistance, where a large amount of current, with a small resistance is required; and the loss of power in a minute (I cannot afford to show you the effect of a longer duration) will give you some idea of their constancy.

Let us just take that modification of the Daniell now used in the Post-office and generally for telegraphic use. You have seen that it stands low in the scale for potential; and you will now see that for small internal resistance it stands very low indeed, but that its constancy for one minute at least is perfect. But still the amount of electricity produced in a minute is so very small that it ought to remain constant, there being so little expenditure of force in the time. Now, compare with this two forms of battery introduced by myself for telegraphic purposes—zinc in salt or dilute acid for positive, and carbon placed in granulated carbon and peroxide of manganese with dilute acid for negative. You will see the comparatively enormously large quantity of electricity which this produces; though in the course of a minute, where there is no resistance, it, of course, partially exhausts itself, the peroxide not being able to furnish oxygen rapidly enough for the supply; but, after a short interval of rest, it recovers its full potential. On the London and North-Western Railway ten of these cells were found to work to Manchester equally well with 60 of the ordinary sulphate of copper batteries; not of course, that the potential is six times as large—indeed, it is not more than double—but in damp and wet weather, where there is much leakage from the wires, the small internal resistance of these batteries enables them to supply enough electricity to make up for the leakage, whereas the larger internal resistance of the Daniell batteries prevents them from supplying in a given time more than a comparatively small quantity, which will not bear much loss from leakage. I am glad to say that this form of battery is being fast adopted for railway use. Then we try the Wollaston—a small potential, a small resistance, and a very rapid fall of power; then the Smee—a small resistance, fair potential, and in consequence of the rapid escape of hydrogen, considerable constancy. To this battery the hydrogen fumes are a great objection. Next, try the Le Clanché, a fair original potential, moderate resistance, and rapid fall of potential. Next, the form I mentioned before as introduced by myself, with a higher potential than the Le Clanché, and much more constant, though, like the Le Clanché, used without an acid, and therefore quite as permanent. It is simply a solution of common salt with a combined salt of sodium, tin, and mercury in the negative. This combination has the peculiar property of being able to extract rapidly the oxygen from the peroxide of manganese. The tin causes in time a little local action, but if it be left out, the mercury by itself cannot so rapidly extract the oxygen, and the local action caused by the tin is very small indeed. Next the "Grove," a high potential, very little resistance, even an increase of potential as the liquid gets warm; Bunsen the same; but both, after a short time, producing intolerable poisonous fumes, which produce dangerous inflammation of the lungs, take away the voice, and when a man's system has once been injured by them, act upon the lungs on subsequent occasions with the utmost rapidity. For myself, I am now so sensitive to them, that I cannot expose myself to them for even a few minutes without losing my voice and my chest getting seriously affected; besides they are far from permanent, as a few hours exhaust their power. Next, I try the bichromate battery, without porous cells: small resistance, high potential, but soon losing its power, and very expensive and wasteful in use, destroying itself by a single night's action. Next, the bichromate, with a porous cell, high potential, moderate resistance, moderate constancy, but very expensive in use. Next, let me take my own form, which for general practical use—as for induction coils, for keeping up a powerful magnetic action when required, and other such purposes—I think is far superior to all others. Zinc in salt, carbon packed in granulated carbon and peroxide of manganese, filled in with dilute sulphuric acid, mixed with a little nitric and chromic acids. Here is very high potential, as I showed you before, moderate resistance and great constancy. I have had them standing for months, used occasionally, and losing but little of their original potential.

For electro-plating, in power, convenience and long endurance, they exceed all others. Some electro-platers prefer iron as the positive, some zinc; for each has his own peculiar preferences and modes of working; but they are now becoming largely adopted, having more than the power of the Bunsen, without the inconveniences, and lasting, I may say, 30 times the length of time. Some electro-platers have had them in daily use for two months at a time. The chromic acid has the especially valuable property of absorbing all nitrous fumes.

To show you the power of the battery, here is a electro-magnet magnetised by a single cell. I will defy the strongest man in this room to separate the soft iron keeper from the magnet..

Where very great constancy and a very large current of electricity is not required, the nitric and chromic acids may be omitted, and then the local action becomes next to nothing; but with the latter a moderate-sized batttery of a single cell has been used for plating six dozen forks at once.

Some business men profess to believe that advertising is of no advantage to them. This is a mistake. Judicious advertising pays better than any other investment a business man can make.

† The mork (|) is intended to denote a porous diaphragm.

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CORRESPONDENCE.

EXPERIMENTS DURING THE RECENT ELECTRICAL STORM.

To the Editor of the Journal of the Telegraph.

During the recent extensive storm, "atmospheric electricity," in considerable quantities, was developed on some lines. It was of sufficient strength to produce brilliant sparks and violent shocks, precisely the same as those experienced from the charge of a Leyden jar.

The line I experimented with was about one hundred miles long, running north-east, and fitted out with "lightning rods" for a part of its length. It was open and insulated at its north end, while the sonth end communicated with the ground.

Whenever the line was opened and closed, instantaneous currents were produced at the moment of contact, causing sparks, and strong magnetism in the relay magnets, though, at other times, no magnetism was perceptible. These currents were of varying intensity, sometimes producing almost a flame, which leaped over a considerable intervening space of air. When points of plumbago were interposed, and contact made with them, the light was of dazzling brilliancy.

When contact was made oftener than twice or thrice per second, the currents were weak, evidently requiring a second or two to attain full strength; longer time than this, however, made them no stronger.

The currents did not seem to interfere with working of the line, when the batteries were again connected, but rather aided it by causing the relay magnets to act with greater promptness, bringing the armature forward with great force at every contact. This seems to indicate that atmospheric electricity, when generally distributed along the entire length of a line, and not of too great strength, aids rather than hinders its working.

The "lightning rods" may also tend to produce static induction, similar to that of a Leyden jar, and cause a greater accumulation of electricity than would otherwise take place.

These currents were different from those produced by lightning—being less intense, and not as sudden, resembling somewhat those produced by the Aurora Borealis, but not as constant as the latter, and of intermediate intensity. A lightning-arrester had no power over them.

Not having access to a galvanometer, their strength or direction could not be determined.

J. J.

DISHONEST MANAGER OF A TELEGRAPH INSTITUTE.

WILMINGTON, Delaware, Jan. 28th, 1873.

A man named Chas. E. Wilkinson opened a "Telegraphic Institute" in a private house in this city, sometime during last Summer, and subsequently removed to rooms in the Masonic Hall, where, by delusive advertisements, &c., he induced some thirty or fifty persons to pay him $30 each, for three months tuition, during which period they were led to believe they would become competent operators, and failing to become so, terms to be $10 per month thereafter. He represented to quite a large proportion of his scholars that he had positions for them to which they were to go January first, 1873. The Christmas holidays arriving, Mr. Wilkinson thought it very proper to spend the joyous season among his old friends and relatives elsewhere, and has not yet seen fit to return; so that for some days following the first of January (the time for re-opening the institute,) the deluded scholars (both male and female,) were anxiously enquiring "Why don't he come?"

His rent for the room being due, the small outfit left by him was sent to the auction room, and sold under attachment of the landlord. But he had not gone away unprepared to repeat the swindle on some other unfortunate locality, for instead of finding the outfit of an institute, but one sounder and key, with a few battery jars, were left; so that it is not improbable that he is planning his nefarious scheme for further humbugging the innocent public at some other point.

W.

MEMORY.

To the Editor of the Journal of the Telegraph:

Telegraphing being a vocation which requires considerable of what may be termed mechanical action of the brain, a quick and retentive memory is one of its most necessary qualifications; for the operator must have the ability to use what he has learned without consuming any time hunting it up. Some are naturally gifted in this way, and for them it is easy to retain and apply what has been acquired; but others (those of us who upon consulting the looking-glass, find a slight depression in the forehead, over the root of the nose) acknowledge our deficiency as very troublesome and disheartening.

We must not, however, be discouraged, but set to work with brave spirits to supply the want. How can this be done? The answer is, practice, regular, every-day exercise of the faculty. How is the piano mastered? By untold hours of patient, monotonous drumming, until at last the fingers fly over the keys faster than conscious thought can follow them, and each note is a rounded harmony. In what way did all of us learn to read? Persistent, wearisome effort is the price paid for almost every acquirement worth having. Memory is said by mental philosophers to grow by using, quicker and easier than most other faculties; and those anxious to develop it will find so many ways of so doing that suggestions are scarcely needed; a few, however, may not come amiss.

It is a good plan to write every day some recollected circumstance, with the determination that a certain number of pages shall be filled within the year; or to make a list of all the people one has ever known, their complexions and temperaments. When evening comes, to live over again the events of the day, is excellent practice; and one who has never tried this will be surprised to find how hard it is to keep hold of the thread of events, even for one little day, and recall each trifling incident. A ruinous habit is that of running through a large amount of reading, allowing ideas to flash through the mind, and away, leaving apparently no impression; but they are making an impression; gradually wearing the memory as smooth as an old file, until after a while nothing will catch hold of it. Injudicious cramming is as bad for head as stomach, and will surely produce mental dyspepsia. The student who aims to develop memory should carefully avoid reading more than can be thoroughly understood, and at least in a measure retained.

Some readers, and perhaps you, Mr. Editor, may smile at my rambling ideas about learning to telegraph; but a good mechanic looks well to his tools, and will tell you that unless they are in order they will not do proper service. The brain is our workshop, and its many faculties our materials for mechanism; as they are cared for and educated, will our labors be crowned with success.

How happy the possessor of this faculty of recalling at will the treasures of knowledge which day by day are gathered on the journey of life; what he knows, can, when needed, be made to serve personal uses, and what he tries for is usually gained, for he holds one of the surest passports to success that can be given to the intelligent worker.

A.

REFITTING OF THE SAN FRANCISCO OFFICE, &c.

SAN FRANCISCO, Jan. 31, 1873.

To the Editor of the Journal of the Telegraph:

A peep into the newly enlarged and refitted operating room of the Western Union Company, in this city, shows one of the neatest, most comfortable and convenient offices outside of New York.

The room is about twenty feet wide by thirty-three feet deep, with a sunny exposure, and well lighted by three windows and a large, central skylight, which also gives excellent ventilation. The walls are hung with tinted paper, and wainscoated in imitation panels of walnut and oak.

The floor, which is laid in three-inch strips of selected wood, is varnished and polished.

The centre of the room is occupied by three handsome tables of the new pattern, made of highly finished walnut and oak, each table accommodating four operators, and the spaces divided off by plate-glass screens. Two smaller tables in the corners are devoted to stock printers, repeaters, &c. The manager's desk is at the rear end of the room. There are admirable arrangements for copying and distributing messages, and for conveying messages between the operating room and the receiving department.

The switch, handsomely framed, is at the foot of the room, and below it stands a large and beautifully finished tangent galvanometer and constant coil, for testing lines and batteries. This form of galvanometer was adopted because of its exceeding simplicity. Any operator can test all the wires in a few minutes, and record the deflections for each wire. He can judge at once, by comparison, of the working conditions of his wires, and the electrician subsequently works up the readings and records to the exact figures. The line wires are led in through the skylight, and between the roof and ceiling, to the switch, thence in cables, under the flooring, to the tables. The instruments are all new, and of the Electrical Construction Company's new pattern, and are, in point of neatness of design and finish, and in working efficiency, the best we have ever seen.

The local battery in use, devised by Mr. Field, and consisting of two cells, works the thirteen sounders, and could as easily work double that number. The current on each sounder is much stronger than with two cells of Daniell, and is constant and unvarying. The consumption of zinc and sulphate of copper does not exceed that of five cells of Daniell on short circuit.

Forty cells of Grove work the nine main lines, which are from 130 to 450 miles in length, and they work admirably.

The force in this department consists of Mr. J. S. Urquhart, manager; Messrs. C. P. Hoag and C. J. Thomas, day and night chief operators, and Messrs. John R. Youtz, George Sawyer, J. I. Sabin, N. H. Browne, A. L. Baker, John Campbell, C. Dwyer, John Foley, H. Vinton and T. S. Cunningham, operators, and a more efficient, willing and pleasant corps of men has seldom been organized. The same remarks will apply equally to the operating force at Sacramento, Reno and Virginia City.

The Superintendents of this Division express a just pride in the *personnel* of their operators, and the operators are too appreciative of the Company's kindly interest in them ever to suffer the present standard of efficiency to be lowered through any fault of theirs.

The Sacramento office is also to be refitted in a short time, and general preparations are being made to handle the increased business which the reduced rates and prosperity of the entire coast promise to the Company this year.

DUPLEX.

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TELEGRAPHERS' INSURANCE.

To the Editor of the Journal of the Telegraph:

I find that the establishment of agencies is working well, especially in my territory. Many telegraphers never heard of the association, and those who have don't know how to become members. I enclose one letter from a number I have received, which speaks for itself, and I would state, for the benefit of others, that my way of procedure is to enclose a blank application with a letter briefly explaining the working of the association, to managers or operators who I have first ascertained to be worthy men, and requesting them to send me their applications. I succeed, because the aim and object is seen at a glance to be a good one.

I hope to live to give many a dollar to the loved ones those who *must* die will leave behind them, and I urge all good and true men to rally to our cause and so swell our numbers, that when death comes we may close the circuit willingly, and without a fear that those dear to us will suffer.

IOWA.

To the Editor of the Journal of the Telegraph:

PEORIA, Ill., Jan. 31st, 1873.

Noticing several accounts of fast work on the President's message in your paper, and noticing also that the Indianapolis spokesman wishes to know who can get a-head of their record, if the following is worth it, please publish.

The President's message, 11,335 words, was received over *one* wire in Peoria, Ill., office, between the hours of 8.30 and 10.45 P. M.—7 hours and 15 minutes—Messrs. Heaton, Dinsley and Whitcomb doing the work.

The Indianapolis time, 2.15 to 6.30 P.M., over *two* wires, equals 8 hours and 30 minutes over *one* wire; 1 hour 15 minutes longer than ours.

W.

RULE 54.

To the Editor of the Journal of the Telegraph:

Will you gently drop into the ear of "Chicago" a loud whisper, which shall arouse him to a continual (not irregular) compliance with Rule 54. Oh! the trouble and work he causes by his forgetfulness of this rule.

IOWA.

T. M.—The only complete volume of the JOURNAL we have is Volume V. This we can furnish, bound, for two dollars per copy. We have incomplete files of the other volumes.

H. B. D.—Without doubt, it is desirable that operators employed upon the lines in Mexico should have a fair knowledge of the Spanish language. But it is not essential.

J. C. C. —Good operators, or even those classed as fair, can always obtain situations. Address a letter to any of the Superintendents, a full list of whom we gave in our last issue.

THE PUGET SOUND TELEGRAPH COMPANY.

THE stockholders of the Puget Sound (Oregon) Telegraph Company held a meeting at Port Townsend on Monday, the 6th of January, at which the following gentlemen were elected trustees of the company for the year 1873; Cyrus Walker, D. C. Rothschild, Marshall Blinn, O. F. Gerrish and William Renton. At a subsequent meeting of the trustees, on Thursday, the 9th, O. F. Gerrish was elected President; Cyrus Walker, Treasurer, and Fred. Drew, Secretary.—*Daily Oregonian.*

FOREIGN TELEGRAPHIC ITEMS

FRENCH POSTAL TELEGRAPHS.—By special measures, concerted between the French Ministers of the Interior and of Public Works, an arrangement has been completed for the reception and transmission of private despatches from the telegraph posts established at the locks of canals and canalized rivers, a commencement being made with stations on the Burgundy Canal. This concession, however, is limited, as far as delivery is concerned, to despatches marked "Bureau Restant," *i. e.*, not forwarded, which seems to be a material restriction and reduction in the value of the arrangement for the service of the public.

THE decree granting a concession to a Spanish company to lay a cable between Cadiz and Cuba, with stations at the Canaries and Teneriffe, has been duly signed by the Spanish authorities recently.

THE company for establishing telegraphic communication between Lisbon and Brazil has been registered under the name of the "Brazilian Submarine Telegraph Company (Limited)," with a capital of £1,300,000, in shares of £10 each.

THE telegraphic communication now established between London and Sydney, Australia, is said to be a great success. It is, however, feared that the cable (already once broken) will cause some trouble, for half of its length is in deep sea, where it will probably encounter rough usage; the other half, however, lies in less than 100 fathoms water, and rests on a good bottom. The land line of 2,000 miles of wire, stretching from Port Augusta to Port Darwin, will doubtless involve a large expenditure annually for repairs, &c. The cost of a message at present renders private intercourse almost impossible, the price per word being 10s.

THE *Diario Official* of Bogota, of the 14th ult., announces that telegraphic communication was established between the capital of Cundinamarca and Sucre on the 13th of November last, and to the port of Buenaventura on the 10th of December.

THE traffic receipts of the Great Eastern Telegraph Company for December, 1872, amounted to £32,175—an increase of £9,913 on the corresponding week of the previous year.

THE total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ending January 4, 1873, was 256,035—an increase over the corresponding week of last year of 38,517.

THE directors of the China Submarine Telegraph Company have declared an interim dividend of 3s. per share for three months ended 31st of December, payable on the 31st of January.

ADVICES from Japan of December 23, 1872, state that a notice had been published that the telegraph line would be opened from Yokohama to Europe on the 20th of January, and that test messages had already passed through the cable.

TELEGRAPHIC communication is increasing throughout the colony of Queensland. A tender has been accepted for erecting a new telegraph line from Twenty-mile Creek to Stanthorpe.

THE PENSACOLA TELEGRAPH CO.

The Pensacola Telegraph Co. have just completed the extension of their lines to Milton, Fla., and this event was the occasion of much jubilation at that point.

DISCHARGE OF A LEYDEN JAR.

Professor Rood, of Columbia College, in a paper gives the results of some investigations "On the nature and duration and the discharge of a Leyden jar in the "*American Journal of Science and Arts*," connected with an induction coil. He summarises the general results as follows:—

If a Leyden jar of a selected size, with a fixed striking distance, be connected with an induction coil, the act of exciting the coil will charge and discharge it at once; as the size of the jar is diminished it will be charged and discharged oftener, and an aureol or violet discharge will begin to mingle itself with the spark of discharges, and as the size still further diminishes, will finally replace all of them except the first; for it is evident that we may regard two brass balls, with an intervening layer of air, a millimetre thick, as a minute Leyden jar, representing the last of the series. The combination of the aureol with multiple sparks is, I think, to be explained thus: the first spark heats and rarifies the air between the electrodes; if then the electric current is furnished with sufficient rapidity by the coil, the tension of the electricity in the jar may rise sufficiently for a discharge through the rarified air before it can cool down, and thus produce the violet light. This state of matters would continue till the electricity began to be furnished more slowly by the coil, when it would result that the air between the electrodes, having time to cool down, would no longer permit the electricity to pass through it in an unbroken stream, but would compel it to discharge itself in sparks. According to this idea, the successive sparks ought to be separated by a gradually increasing interval, and this indeed appears to be the case, the rise of the separating interval being particularly strongly marked towards the close of the total act. Brass balls favor this mixed form of discharge, perhaps, by confining the air to a certain extent, and thus preventing it from cooling down. Platinum points can have no such influence, and with them this phenomenon is rare. With the larger jar it never occurred, as the air was able to cool down before the electric tension had sufficient time to rise in its larger surface, so as to warrant a discharge. With the small jar and longer striking distances, the violet light was not produced for an analogous reason, and also, perhaps, because the air was less confined.

THE Boston *Globe*, which, as excluded from the Associated Press, is a warm advocate of the postal telegraph, said on Tuesday, referring to the reported assassination of the President:

Does any one suppose that such a ridiculous and disgraceful falsehood as the sensational report relating to General Grant, which was sent over the wires by the agents of the telegraph, on Saturday, could have thus been disseminated had the postal telegraph been in operation? Telegraphy should be in the responsible hands of the government, not in those of a money-making monopoly.

Is the veil withdrawn so soon? Does the *Globe* so readily acknowledge that the telegraph, when owned by the government, is to be subject to government censorship, *a la* France and Russia? We know that Mr. Creswell does not intend such a policy now, but we ask him to see whither his policy is likely to lead.—*Troy Daily Whig.*

A BILL has been introduced in the Assembly, at Albany, making it a misdemeanor, punishable by fine or imprisonment, for any person or persons, to affix in any manner, any show bill, hand bill, or other lettered, printed, or written notice or advertisement whatever, on telegraph poles and other structures within the limits of the city of New York, without first obtaining permission from proper authority.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
February 15, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Beaver Meadow, Ala., re-opened.
Covington, Ga., re-opened.
Caledonia, Ill., is in Boone Co.
Dawville, Iowa, should read Dowville.
Harrison Square, Mass., office now open, square 21; erase delivery charges.
The P. O. A. of South Dedham, Mass., is Norwood.
Hanson, Mass., changed to South Hanson.
Messages for Falmouth, Mass., should be sent and checked to Cohasset Narrows, Mass.
Quitman, Miss., closed.
Toombsuba, Miss., closed.
Triplett, Mo., closed.
Rochester, N. H., should read { 25 2 17 Great Falls, N. H. / 25 2 14 Portland, Me.
Maple Hill, N. Y., closed.
Hestonville and Park Drove Yards, Pa., closed. Business will hereafter be delivered from West Phila. Charges for delivery 25 cents.
Phillipsburg, Clarion Co., Pa., re-opened.
Now London, Pa., is in Warren Co.
Hallville, Texas, closed.

NEW OFFICES.

* Cache Creek, B. C.	150 † 60 Laconner, W. T.
* 127 Mile House, B. C.	150 † 60 Laconner, W. T.
* Altamont, Cal.	50 † 25 San Francisco.
* Belmont, Cal.	30 † 15 " "
* Chinese Camp, Cal.	60 † 30 Sonora ck. San Fran.
* Freeno, Cal.	90 † 30 San Francisco.
* Goshen, Cal.	125 † 60 " "
* Jamestown, Cal.	60 † 30 Sonora, ck. San Fran.
* Melrose, Cal.	30 † 15 San Francisco.
* Milbrae, Cal.	30 † 15 " "
* Sargents, Cal.	60 † 30 " "
* Tipton, Cal.	125 † 60 " "
* Tulare, Cal.	125 † 60 " "
* Wilmington, Cal.	60 † 30 Los Angeles, ck. San Fran.
* Centre Brook, Conn.	30 3 33 Hartford, Conn.
25 Oneco, Conn.	
196 Thomson, Ga.	
326 Brooklyn, Ill.	
318 Lovington, Ill.	
318 Oakland, Coles Co., Ill.	
241 Auburn Junction, Ind.	
261 Cherubusco, Ind.	
281 Malott Park, Ind., P. O. A. is James Switch, Marion Co.	
261 North Manchester, Ind.	
261 South Whitley, Ind.	
85 Towsontown, Md.	
21 Norwood, Mass., check South Dedham.	
18 South Hanson, Mass.	
240 Dimondale, Mich.	
179 Grindstone City, Mich.	
240 Springport, Mich.	
352 Pickens, Miss.	
389 Chamois, Mo.	
Franktown, Nev.	
* Glenbrook, Nev.	40 † 15 Carson, Nev.
* Raspberry, Nev.	85 † 30 Elko, Nev.
Stough and Lewis, Nev., also known as White River.	
* Tecoma, Nev.	60 † 30 Elko, Nev.
Woodland, Nev.	
74 Amboy Station, N. Y.	
37 Bedford Station, N. Y.	
37 Golden Bridge, N. Y.	
65 North Norwich, N. Y.	
134 Mebanesville, N. C.	
115 Morrisville, N. C.	
253 Elizabethtown, O.	
59 Fleetwood, Pa.	
* Blue Creek, Utah.	30 † 10 Corinne, Utah.
* Hampton, Utah.	85 † 35 Salt Lake.
* Hebron, Utah.	150 15 Salt Lake.
Martinez, Utah.	
* North Star, Utah.	150 15 Salt Lake.
* Pine Valley, Utah.	150 15 " "
* Richfield, Utah.	85 † 35 " "
* Utah North Junction, Utah.	60 † 25 Salt Lake.
Cowlitz Station, W. T.	
Tacoma, W. T.	

Half rate messages may be taken for, and received from Milton, Fla.

† The addtional word rate is for five words or less.

CUBA CABLE BUSINESS.

We are notified the cables beyond Jamaica are interrupted, and that in consequence of such interruption messages for the Windward Islands and British Guiana will be forwarded with all possible despatch, by steamers and uninterrupted lines, at the following rates:

TO	From Offices in U. S. East of Mississippi River and St. Louis.		From Offices in U. S. West of Mississippi River, except St. Louis.		From New Brunswick and Nova Scotia.	
	10 words.	Each add'l word.	10 words.	Each add'l word.	10 words.	Each add'l word.
	GOLD.		GOLD.		GOLD.	
Porto Rico..	$7.75	$ 69	$10.50	$1.06	$8.75	$ .79
St. Thomas.	8.13	72	10.88	1.09	9.13	.82
St. Kitts.....	9.00	81	11.75	1.18	10.00	.91
Antigua	9.25	84	12.00	1.21	10.25	.94
Gaudaloupe .	9.63	87	12.38	1.24	10.63	.97
Dominica....	10.00	91	12.75	1.28	11.00	1.01
Martinique ..	10.75	94	13.50	1.31	11.75	1.04
St. Lucia....	11.00	96	13.75	1.33	12.00	1.06
St. Vincent..	11.25	99	14.00	1.36	12.25	1.09
Grenada	11.75	1.04	14 50	1.41	12.75	1.14
Barbadoes...	11.88	1.05	14.63	1.42	12.88	1.15
Trinidad	12.25	1.09	15.00	1.46	13 25	1.19
Demerara ...	14.25	1.29	17.00	1.66	15.25	1.39
Berbice.....	14.25	1.29	17.00	1.66	15.25	1.39

Steamers leave Santiago de Cuba for St. Thomas on the 6th, 9th, 20th and 25th; also Kingston on the 9th and 24th of each month.

NOTE.—In addition to the foregoing charges, the usual charge of $3.00 per message for steamer charges from Key West, Fla., on all Cuba cable business should be made.

ATLANTIC CABLE BUSINESS.

We are notified that the cable between Hong Kong and Shanghai is broken. Messages for places beyond Hong Kong, if via Falmouth or Teheran, must therefore be posted at Hong Kong.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Feb. 10th, 1873.

Maysville, Ky., office has been transferred from G. T. Williams' district to J. B. Tree's district.

G. H. MUMFORD, *Vice-Pres't.*

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKNOWLEDGMENT OF RECEIPTS FOR ASSESSMENTS 37 & 38 UP TO FEBRUARY 12th.

The acknowledgment of receipt of any assessment is to be understood as an acknowledgment for all previous assessments.

2 5 6 13 16 17 21 23 28 46 52
54 56 59 60 61 64 72 74 77 86 88
91 93 103 104 106 108 113 131 133 134 138
140 141 142 144 145 153 157 166 172 175 183
188 208 211 220 228 235 244 245 254 254½ 255 257 269 274
275 276 286 289 291 301 302 312 316 341 342 346 349 351
352 361 371 372 378 379 380 383 394 405 406
411 413 414 416 420 426 430 433 438 441 456
463 464 467 476 478 508 509 510 526 532 536
547 548 552 555 560 562 564 576 577 586 587
603 604 618 626 627 629 642 655 656 662 663
664 665 667 669 685 701 708 715 716 721 731
740 742 750 751 756 764 776 789 791 797 799
803 809 812 815 821 830 831 832 842 855 858
859 870 873 880 883 886 915 917 923 929 930
932 938 941 943 952 966 976 980 995 996 1000
1002 1005 1009 1011 1013 1023 1024 1039 1040 1046 1055
1062 1073 1074 1075 1076 1081 1085 1088 1090 1111 1126
1137 1143 1144 1145 1146 1147 1148 1163 1167 1173 1174
1175 1182 1183 1199 1200 1204 1225 1228 1233 1245 1252
1254 1255 1259 1260 1266 1271 1276 1277 1282 1295 1300
1303 1304 1306 1329 1336 1339 1340 1342 1343 1344 1345
1346 1348 1349 1350 1351 1352 1358 1359 1363 1364 1365
1366 1368 1371 1394 1398 1402 1403 1407 1409 1410 1419
1427 1429 1440 1444 1448 1451 1453 1454 1455 1456 1463
1481 1482 1484 1489 1503 1506 1507 1508 1511 1513 1515
1516 1517 1519 1522 1524 1527 1531 1535 1555 1558 1560
1561 1566 1568 1571 1577 1579 1582 1586 1587 1590 1591
1610 1622 1623 1626 1629 1630 1635 1636 1637 1645 1652
1666 1678 1684 1685 1686 1687 1688 1695 1697 1698 1699 1705
1706 1708 1709 1710 1711 1718 1719 1720 1821 1738 1794
1725 1728 1729 1733 1735 1736 1745 1763 1781 1785 1791
1803 1804 1805 1806 1807 1808 1809 1810 1811 1812 1813
1814 1815 1816 1817.

ASSESSMENT 37 ONLY.

29 133 277 316 323 333 447 547 622 76 916
939 941 1014 1016 1043 1057 1063 1066 1098 1154 1198 194
1251 1267 1495 1499 1502 1550 1593 1594 1595 1630 1666
1667 1669 1670 1671 1672 1673 1707 1710 1712 1714 1715
1716 1718 1722 1726 1727 1730 1731 1732 1734 1737 1738
1739 1740 1742 1743 1744 1746 1747 1749 1750 1751 1752
1753 1754 1755 1756 1757 1758 1759 1760 1761 1762 1764
1765 1766 1767 1768 1769 1770 1771 1772 1773 1774 1775
1776 1777 1778 1779 1780 1781 1782 1783 1784 1785 1786
1787 1788 1789 1790 1792 1793 1794 1795 1796 1797 1798
1799 1800 1801 1802

For the benefit of a few who are unable to comprehend how it is—as per notices sent out February 1st—that the returns from assessment 36 are "for the benefit of the heirs of R. S. Raymond," and, at the same time, assessment 37 is occasioned by his death, we would explain that when a member dies his heirs receive the fund on hand, or in other words, the proceeds of the last assessment made previous to his death. Thus, in the case of Mr. Raymond, his heirs received the returns of assessment No. 36, which of course depleted the treasury, and No. 37 was called in order to make the fund good again for the next death. M. G. Chettle's heirs will receive the benefit of 37, and assessment 38 is ordered to make the amount good again in the treasury.

The following letter from our agent at Memphis, Mr. J. J. Fowler, gives the following particulars of Minah J. Chettle's death:

"He died of tubercular menigitis, at 3 A. M. Jan. 23d, aged twenty-four years. The disease manifested itself Dec. 1, and on the evening of the 2d he reported himself as being too unwell for duty. Thinking that his illness was but the result of a severe cold, and that the quiet and care of a few days rest would benefit him, he neglected calling in medical attention until his symptoms were of a serious character. From that time until the first of January his condition was critical. He then began convalescing. In his enthusiasm he imprudently exposed himself, producing a relapse on the 12th inst., which confined him to his room and bed, and terminated, after intense suffering, in death on 23d January. He was a steady, industrious and upright young man, and the fraternity has lost one of its best operators. While ill he received every attention from his relatives and associates. The money coming from the Insurance Association he directed should be paid to Mr. Wm. Chettle, of Water Valley, Miss."

Deaths come to us thick and fast. The regular announcements of the deaths of R. S. Raymond and M. J. Chettle had hardly been issued when we were pained to hear of the demise of another of our early members, Mr. Robert N. Norton, of Ironton, Ohio, which occurred on February first. His certificate, No. 422, was issued February 16th, 1869.

Mr. W. W. Pritchard, manager at Ironton, O., writes that Mr. Norton has been confined to his bed for about four months, from disease of the hip, which, it is thought, terminated in consumption. He was employed in the Catlettsburg, Ky., office until taken sick. He leaves a wife and babe, to whom the money accruing from assessment 38 will bring many blessings, as nearly all their means have been exhausted by the long sickness of the deceased.

NEW ADVERTISEMENTS.

Washington Telegraph Agency—George C. Maynard.

Special Notice—L. G. Tillotson & Co.

Telegraph Instruments and Supplies—Geo. H. Crain & Co.

Nonpareil Telegraph Instrument—F. L. Pope & Co.

Pensacola Telegraph Co.

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ELECTROSCOPIC EXPERIMENTS.

The following article on "A Cause of Error in Electroscopic Experiments," by Sir Charles Wheatstone, extracted from the *Proceedings of the Royal Society*, is interesting, as it shows the necessity of great precaution in making experiments with the Electrometer :—

"To arrive at accurate conclusions from the indications of the electroscope, or electrometer, it is necessary to be aware of all the sources of error which may occasion these indications to be misinterpreted.

"In the course of some experiments on electrical conduction and induction, which I have recently resumed, I was frequently delayed by what at first appeared to be very puzzling results. Occasionally, I found that I could not discharge the electrometer with my finger, or only to a certain degree, and that it was necessary, before commencing another experment, to place myself in communication with a gas-pipe which entered the room. How I became charged, I could not at that time explain ; the following chain of observations and experiments, however, soon led me to the true solution.

"I was sitting at a table not far from the fireplace, with the electrometer (one of Peltier's construction) before me, and was engaged in experimenting with discs of various substances. To ensure that the one I had in hand, which was of tortoise-shell, should be perfectly dry, I rose and held it for a minute before the fire ; returning and placing it on the plate of the electrometer, I was surprised to find that it had apparently acquired a strong charge, deflecting the index of the electrometer beyond 90°. I found that the same thing took place with every disc I thus presented to the fire, whether of metal or any other substance. My first impression was that the disc had been rendered electrical by heat, though it would have been extraordinary that, if so, such a result had not been observed before ; but on placing it in contact with a vessel of boiling water, or heating it by a gas-lamp, no such effect was produced. I next conjectured that the phenomenon might arise from a difference in the electrical state of the air in the room and that at the top of the chimney ; and to put this to the proof, I adjourned to the adjacent room where there was no fire, and bringing my disc to the fireplace, I obtained precisely the same result. That this conjecture, however, was not tenable, was soon evident, because I was able to produce the same deviation of the electrometer, by bringing my disc near any part of the wall of the room. This seemed to indicate that different parts of the room were in different electrical states ; but this again was disproved by finding that when the position of the electrometer and the place where the disc was supposed to be charged were interchanged, the charge of the electrometer was still always negative. The last resource was to assume that my body had become charged by walking across the carpeted room, though the effect was produced by the most careful treading. This ultimately proved to be the case ; for, resuming my seat at the table, and scraping my foot on the rug, I was able at will to move the index to its greatest extent.

"Before I proceed further, I may state that a gold-leaf electrometer shows the phenomena as readily.

"When I first observed these effects, the weather was frosty ; but they present themselves, as I have subsequently found, almost equally well in all states of the weather, provided the room be perfectly dry.

"I will now proceed to state the conditions which are necessary for the complete success of the experiments, and the absence of which has prevented them from being hitherto observed in the striking manner in which they have appeared to me.

"The most essential condition appears to be that the boot or shoe of the experimenter must have a thin sole, and be perfectly dry ; a surface polished by wear seems to augment the effect. By rubbing the sole of the boot against the carpet or rug, the electricities are separated, the carpet assumes the positive state, and the sole the negative state ; the former being a tolerable insulator, prevents the positive electricity from running away to the earth, while the sole of the foot, being a much better conductor, readily allows the charge of negative electricity to pass into the body.

"So effective is the excitation, that if three persons hold each other by the hands, and the first rubs the carpet with his foot, while the third touches the plate of the electrometer with his finger, a strong charge is communicated to the instrument.

"Even approaching the electrometer with the hand or body, it becomes charged by induction at some distance.

"A stronger effect is produced on the index of the instrument if, after rubbing the foot against the carpet, it be immediately raised from it. When the the two are in contact, the electricities are in some degree coerced or dissimilated ; but when they are separated, the whole of the negative electricity becomes free and expands itself in the body. A single stamp of the carpet followed by an immediate removal of the foot, causes the index of the electrometer to advance several degrees, and by a reiteration of such stamps, the index advances 30° or 40°.

"The opposite electrical states of the carpet and the sole of the boot, were thus shown : after rubbing, I removed the boot from the carpet, and placed on the latter a proof-plate (*i. e.*, a small disc of metal with an insulating handle), and then transferred it to the plate of the electrometer ; strong positive electricity was manifested. Performing the same operation with the sole of the boot a very small charge was carried, by reason of its ready escape into the body.

"The negative charge assumed by sole-leather, when rubbed with animal hair, was thus rendered evident. I placed on the plate of the electrometer, a disc of sole leather, and brushed it lightly with a thick camel's-hair pencil ; a negative charge was communicated to the electrometer, which charge was principally one of conduction, on account of the very imperfect insulating power of the leather.

"Various materials, as india rubber, gutta percha, &c., were substituted for the sole of the boot ; metal plates were also tried : all communicated negative electricity to the body. Woollen stockings are a great impediment to the transmission of electricity from the boots ; when these experiments were made I wore cotton ones.

"When I substituted for the electrometer a long wire galvanometer, such as is usually employed in physiological experiments, the needle was made to advance several degress.

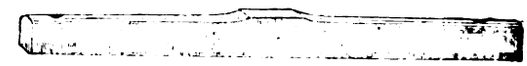
"At the meeting of the British Association in Dublin in 1857, Professor Loomis, of New York, attracted great attention by his account of some remarkable electrical phenomena observed in certain houses in that city. It appears that in unusually cold and dry winters, in rooms provided with thick carpets and heated by stoves or hot-air apparatus to 70°, electrical phenomena of great intensity are sometimes produced. A lady walking along a carpeted floor drew a spark one quarter of an inch in length between two metal balls, one attached to a gas-pipe, the other touched by her hand ; she also fired ether, ignited a gaslight, charged a Leyden jar, and repelled and attracted pith-balls similarly or dissimilarly electrified. Some of these statements were received with great incredulity at the time both here and abroad, but they have since been abundantly confirmed by the Professor himself and by others. (See Silliman's *American Journal of Science*, July, 1858.)

"My experiments show that these phenomena are exceptional only in degree. The striking effects observed by Professor Loomis were feeble unless the thermometer was below the freezing-point, and most energetic when near zero, the thermometer in the room standing at 70°. Those observed by myself succeed in almost any weather, when all the necessary conditions are fulfilled. Some of these conditions must frequently be present, and experimentalists cannot be too much on their guard against the occurrence of these abnormal effects. I think I have done a service to them, especially to those engaged in the delicate investigations of animal electricity, by drawing their attention to the subject."

On the evening of the 12th instant, General T. T. Eckert, General Superintendent of the Eastern Division, was complimented by a dinner at the Astor House by the Superintendents of his division, as an expression of their kindly feelings toward him on the occasion of his contemplated departure for Europe.

IMPROVEMENT IN THE FORM OF CROSS ARMS.

All the cross arms used by the Western Union Company in future are to be rounded off upon the upper sides, and made slightly sloping toward the ends, so as the more readily to shed rain. The accompanying cut will serve to illustrate the plan



which has been adopted. Not only will this change improve the insulation of the lines, but it will greatly improve their appearance also.

Mr. D. W. Pitfield, lately station agent and manager W. U. Telegraph Company at Moncton, N. B., has been appointed chief operator and train despatcher for the Western and Central Divisions of the Intercolonial Railway. His headquarters are at Moncton, N. B.

Mr. Luther B. Archibald, manager W. U. Telegraph Company at Truro, Nova Scotia, has resigned, and takes the position of chief operator and train despatcher Eastern Division Intercolonial Railroad. Headquarters at Truro, Nova Scotia.

The Boston *Globe* is responsible for the following : Mr. E. D. L. Sweet, executive manager of the Atlantic and Pacific Company, says :—"The object of all conferences and consultations between the officers of the independent companies has been, and will be in future, as to how the telegraph business, as entrusted to them, can be most economically and *inefficiently* handled."

We don't believe Mr. Sweet intended to say inefficiently.

BORN.

Prichard—At Ironton, O., Feb. 1, 1873, to W. W. Prichard, Manager W. U. Tel. Office, of a son.

MARRIED.

Case—Morgan.—At Lafayette, N. Y., Feb. 5, 1873, in the M. E. Church, by Rev. A. R. Palmer, Homer Case, Manager W. U. Tel. Office, to Emma J. Morgan, all of Lafayette.

Kuenely—Kearins.—At Colfax, Cal., Jan. 20, 1873, Jacob Kuenzly, Manager W. U. Tel. Office, Colfax, Cal., to Miss Maria Kearins, of Providence, R. I.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, FEBRUARY 15, 1873.

ANOTHER REDUCTION IN CABLE RATES.

At a meeting of the Board of Directors of the Anglo-American and the French Atlantic Telegraph Companies, held at London, on Friday, 7th instant, and at a meeting of the Directors of the New York, Newfoundland and London Telegraph Company, in this city, on the day following, it was unanimously resolved to reduce the tariff on messages between New York and Great Britain, from one dollar to seventy-five cents per word, and between New York and France to seven dollars and fifty cents for ten words.

This reduction goes into effect on and after May 1st next.

In our issue of January 16, 1873, we had occasion, in answering a question from a correspondent, to point out the proper course to have been taken in the reception, at Ludlow, of a message directed to Boston, which message was an answer to one dated at Fitchburg. It appears that we have not been fully understood as to the course Ludlow should have pursued in the matter; and we learn further, from other correspondents, that it is an every-day occurrence, throughout the country, for messages to be received and forwarded in a similar manner; the Company thus taking the risk of collection. We think that our correspondents err in this showing, but if the statement is correct, it is time that a better understanding should be arrived at.

In this case, and in all similar cases, the proper treatment of the business would be for Ludlow to have exacted prepayment, or the equivalent, for the message offered as an answer, it being clear that, in the event of the Boston office being unable to find the party addressed, the tolls could not be collected there. The person had left Fitchburg, as was evident from the original message, therefore, Fitchburg could not collect.

The message from Ludlow to Boston was not an answer within the meaning of the rule, and but little reflection is required to arrive at that conclusion.

A SUPPLEMENTARY tariff sheet, which will contain all changes in rates which have taken place since the present tariff book was issued, is in preparation, and probably will be sent to offices some time in March.

PURCHASE OF THE CUBA CABLE LINES.

A meeting of the Directors of the Western Union Telegraph Company was held, February 8th, at which the action of the President in the purchase of stock of the International Ocean Cable Company was confirmed. This Company is known more particularly as the Cuba Cable Company, the termini of which are Havana and Key West, from which latter point it has land lines extending into the State of Florida, where it has connections with the lines of the Western Union. It will be remembered that a meeting was held on the 2d of June, 1872, at which the President of the Western Union was authorized to purchase sufficient stock in the Cable Company to secure control, and from time to time such stock was purchased as could be obtained, though not sufficient to attain the object aimed at. At a more recent date some strong parties, representing English capitalists, appeared in the market for the purpose of buying up the line, though, before action was taken by either of the parties, the Western Union people were fortunate enough to obtain 9,251 shares, thereby securing control of the company. The negotiation was completed on Monday last. According to the terms of sale, payment was to be made at once in cash, whereupon President Orton, after consultation with some of the Executive Committee, authorized on that date the sale of the 15,000 shares of Western Union stock owned by the Company. It should be understood that the first proposition was to pay for the stock of the International Ocean Telegraph Company in the stock of the Western Union, but the parties representing the former Company were unwilling to accept the stock at its then market quotation. This block of 15,000 shares was held as a part of the assets of the Western Union Company, purchased with the surplus funds of the Company with a view of using it in the extension of their lines whenever they should see fit. It will be seen by the resolutions below, that the action of the President in directing its sale on Monday met with but one dissenting vote:

Whereas, at a meeting held June 2, 1871, the President was authorized to purchase stock of the International Ocean Telegraph Company to such an extent as he deemed advisable for the interests of this Company; and

Whereas, the President, in pursuance of negotiations commenced under such authority, has agreed to purchase 4,612 shares of the preferred stock of the International Ocean Telegraph Company, and 4,639 shares of the common stock of said Company; and

Whereas, for the purpose of completing such purchase of stock and making payment therefor, the President, by and with the advice and consent of Messrs. H. F. Clark and Augustus Schell, directed the sale of 15,000 shares of the capital stock of this Company held by the Treasurer as a portion of its cash assets; therefore,

Resolved, That the action of the President in the purchase of said International Ocean Telegraph Company's stock be and the same is hereby approved, ratified, and confirmed.

Resolved, That the action of the President in directing the sale of 15,000 shares of the Company's stock, for the purpose aforesaid, be and the same is likewise approved, ratified, and confirmed.

The first part of the foregoing resolutions was adopted unanimously, and the second with but one dissenting vote.

THE Automatic Telegraph Company have an office in the Capitol at Washington; the transmitting apparatus is a Morse key, the receiving apparatus is a Morse relay and sounder, and as the operator has had some years experience upon the Western Union lines, we see no reason why he should not be able to send communications when the line is in working order.

SENATOR RAMSEY'S REPORT ON THE HUBBARD JOB.

We have been furnished with a copy of Mr. Ramsey's report in favor of the Hubbard scheme, by which Congress is asked to incorporate a Telegraph Company, and confer upon it the right to build and operate telegraph lines in all the States and Territories, and also to provide for a partnership arrangement with the Post-Office Department, by which the Company will be provided with office-room, stationery, light and fuel, and to some extent with clerks, operators, and superintendents, at the cost of that department.

Mr. Ramsey alludes, on the first page of his report, to the disastrous consequences attending the assumption of the telegraph by the Government of Great Britain, and accounts for them by the increase of business, which, consequent upon the reduction of rates, was so great that neither wires, instruments nor operators could be had sufficient to perform the business with despatch and correctness.

This explanation is undoubtedly true to some extent, and should serve as a warning to our Government not to rush heedlessly into the same error by inaugurating a system which shall reduce the rates before providing the proper facilities for satisfactorily performing the increased traffic which would ensue.

The increase in the traffic should not, however, have caused such disastrous consequences in England, because the increase in the number of messages there was not greater than here during the same time. The difficulty is due to the fact, that the Government officials did not comprehend the nature of the business they had undertaken, and properly provide in advance for both the natural increase of the business and that which should have been anticipated from the reduction in rates.

That there has been no such enormous increase in the business consequent upon the governmental absorption of the telegraphs as is claimed, is easily demonstrated. Mr. Ramsey says: Under the old system about 6,000,000 telegrams a year were transmitted; now 15,000,000.

Mr. Gardiner G. Hubbard, in his "Letter to the Postmaster-General on the European and American systems of telegraph, with remedy for the present high rates," printed for private circulation in 1868, states on page 29 that, during the year 1866, 6,127,000 messages were transmitted in England.

Sir Frank Ives Scudamore, the Director-General of the Post-Office Telegraphs in Great Britain, in his report to the Postmaster-General, dated May 31, 1872, says, that the actual total number of messages transmitted during the year ending March 31st, 1872, was 12,473,797.

Therefore the entire increase in the number of messages sent in England during a period of six years, two of which the lines have been operated by the Post-Office, has been only one hundred per cent. In 1868 the Western Union Telegraph Company

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sent, exclusive of Press reports, 5,733,394 messages, and in 1872, 10,932,138, being an increase in five years of about 92 per cent.

This, it will be observed, is the increase of one company only, and if we were to add the business of the Atlantic and Pacific, the Pacific and Atlantic, the Franklin, the Great Western, and the numerous other companies who are competing with the Western Union for the telegraph traffic of the country, the total increase would be found to considerably exceed that of the English governmental lines.

As to the financial condition of the British system it is difficult to arrive at any definite results. The latest report which we have been able to obtain, gives the gross receipts for the fourteen months ending March 31, 1871, at £798,580, and the total expenditures at £1,397,389. A part of this is properly chargable to capital account. Just how much it is difficult to determine. The expenditures in the report are divided as follows: Working expenses, £470,495; Capital expenditure, £926,894.

Under the head of Capital expenditure are £346,-794, for poles, arms, wire insulators, instruments, batteries and tools, none of which items are to be found under the head of working expenses. And yet, how could a telegraph of the magnitude of the British system be worked fourteen months without requiring heavy necessary outlay for these articles, irrespective of construction ?

Under the head of Capital account, £377,449 are also placed, for engineering, salaries and travelling expenses, alteration of buildings, preliminary instruction, bonuses to learners, office fittings, examining accounts of telegraphic companies, law expenses, &c., none of which items appear under the head of working expenses, although just such expenses must continue to be made every year as long as the telegraph is maintained.

If a large annual expenditure is required, however, for extending the telegraphic facilities to meet the wants of the service, it makes little difference, in reality, whether such expenditure be classified under the head of working expenses or capital account.

The assertion in Mr. Ramsey's report, that the rates were reduced in Switzerland in 1866, one-half, and that the number of messages doubled the next year, is only true as to inland messages ; no reduction having been made in the rates for international and transit messages, upon which double tolls are charged for less than half the service.

The official Swiss report gives the total number of messages in 1867 at 708,020, and in 1868, at 1,153,-092, showing an increase of 63 per cent. only. It is also worthy of notice, that there was an increase of 15 per cent. in international and 10 per cent. in transit messages, notwithstanding there was no reduction in the rates in either of the latter classes of messages. The incorrectness of Mr. Ramsey's assertion is shown by his own table ; unless it is admitted, that the expense of conducting the business is from two to three times as much as the rates charged. For example, it is stated, on page 11, that the telegrams in Switzerland in 1867, at the rate of one franc, amounted to 397,289, and the expenses, $130,817, which would make the expense per telegram 33 cents ; and in 1868, 789,186 telegrams at the rate of half a franc, the expenses amounting to $169,496, which would make an average expense of 21 cents per message, or twice the alleged rate.

In stating the amount expended in Switzerland in 1868, Mr. Ramsey entirely omits to mention the sum of 136,116 francs and 15 centimes, expended for construction. Perhaps this omission was not intentional, and may be owing to the fact that the Swiss report omits it from its customary place, an admission of which is made in page 23 of the official report for 1868, as follows :

"Under the head of construction and repairs of "lines, there is a decrease of 64,914 francs from the "amount expended in 1867, and of 23,873 francs and "36 centimes from the amount estimated in the bud-"get. We should observe, however, that in the sum "of 105,126 francs and 64 centimes expended under "this head are not included the expenditures of new "construction. These expenditures, amounting to "the sum of 136,116 francs and fifteen centimes, "were defrayed out of the credit of 500,000 francs "allowed to the administration in accordance with "the federal decree of 17 July, 1867, and only the "interest on the amount received in advance appears "in the above item."

Three kinds of messages are charged for in the European telegraph system, called respectively, Internal, International and Transit. The Internal messages are sent, received and delivered in the same country ; the International messages are sent from one country into another. The Transit messages are neither sent nor received to or from the country in which they are reckoned, but are merely shot through such country on their way from one neighbouring State to another. Previous to 1868 the Swiss Telegraph Administration charged a uniform rate of one franc for a message of 20 words, including address and signature, upon all classes of messages. On the 1st of January, 1868, the rates for Internal messages were reduced to half a franc, while those of International and Transit messages were kept at the old rate of a franc. The result of this operation was as follows: 798,186 Internal messages were transmitted for $87,800.46 and 282.627 International and 72,279 Transit messages were sent for $83,048, making the total receipts $180,848.46. The expenditures for the year being, as above stated, $211,821.29.

Now, while it is true, that the average tolls collected upon the Internal messages were but eleven cents, and that the number of said messages sent during the year was doubled, it must not be forgotten, that the average tolls upon the International and transit messages was 23 cents, and that it was the extra charge upon this class of business which prevented a still greater deficiency upon the whole business for the year.

As so much importance has been attached to the pretended great success of the Swiss system, we deem it worth while to present all the facts relating to the operation of the telegraph in Switzerland from its commencement in 1852 to the close of 1871. These facts are taken from the official reports.

The total expenditures for telegraph service in Switzerland from 1852 to 1871, inclusive, were..... $2,425,896 65
The receipts for Telegrams..... 2,268,202 32

Loss..... $ 157,694 33

During the past twenty years 7,779,603 Internal telegrams were transmitted, the receipts for which amounted to $1,217,625 88 or 15 6-10 cents each ; and 2,895,245 International, and 860,879 Transit messages, the receipts for which were $1,050,576 44, or 28 cents each.

During the above mentioned period, $37,0078 49 were received by the Swiss Telegraph administration, which the official reports state were mainly composed of contributions from the Communes.

An examination of the statistics of the Swiss telegraphs shows that the increase in the number of messages sent is accompanied by an approximately proportional increase in the expenses. Comparisons show that, when the business was small and the wires but partially occupied, a considerable increase in the number of messages was effected without material additions to the lines ; the first outlay having been more than sufficient for the traffic ; but as soon as the traffic increased sufficiently to fully occupy the wires, additional construction became necessary. In 1861, an increase over 1856 of 46 per cent. in the number of messages, was accompanied by an increase in line of 24 per cent., wire 34 per cent., offices 50 per cent., receipts 40 per cent., and of salaries 54 per cent. In 1866, an increase over 1861 of 102 per cent. in the number of messages was accompanied by an increase of 56 per cent. in wire, 81 per cent. in offices, 74 per cent. in salaries, 53 per cent. in the expenditures for lines, and 50 per cent. in other expenses. In 1868, an increase over 1866 of 72 per cent. in messages was accompanied by an increase in the number of miles of line of 20 per cent., number of miles of wire of 56 per cent., in offices of 38 per cent., in salaries of 39 per cent., and in other expenses of 44 per cent. The total receipts were increased by 24 per cent., while the total expenses were increased 54 per cent.

During the year 1867, in anticipation of the large increase of business by the reduction of the tolls, great additions were made to the lines and wires. At the beginning of 1867 there were 4,098 miles of wire in operation in Switzerland, and on the 1st of January, 1869, there were 6,438, being an increase of 57 per cent., while the total increase in the number of messages transmitted was but 63 per cent.; and yet it is officially stated in the report of the working of the Swiss lines, that there was a time during the Summer of 1868 when the number of messages was found to exceed the means of transmission.

The experience in Switzerland is not exceptional, but is substantially the same in all other countries. In 1865, Belgium had 5,400 miles of wire, and transmitted 674,027 messages. In 1868, 8,730 miles of wire, an increase of 61 per cent., and transmitted

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1,053,230 messages, an increase of 56 per cent. In 1866, France had 68,687 miles of wire, and transmitted 2,507,472 messages. In 1868, 89,086 miles of wire, an increase of 29 per cent., and transmitted 3,209,965 messages, being an increase of 28 per cent. In 1865, Italy had 22,800 miles of wire, and transmitted 1,490,175 messages. In 1870, 30,906 miles of wire, and transmitted 1,813,320 messages, showing an increase of 35 per cent. in wire, and 21 per cent. in messages. In 1865, Norway had 2,666 miles of wire, and transmitted 197,312 messages. In 1870, 5,606 miles of wire, an increase of 110 per cent., and transmitted 364,009 messages, an increase of 84 per cent. In 1865, Holland had 3,408 miles of wire, and transmitted 558,501 messages. In 1870, 6,297 miles of wire, an increase of 84 per cent., and transmitted 1,356,812 messages, an increase of 142 per cent. In 1865, Sweden had 6,578 miles of wire, and transmitted 287,929 messages. In 1870, 10,089 miles of wire, an increase of 53 per cent., and transmitted 494,111 messages, an increase of 71 per cent.

In 1866, England had 80,466 miles of wire, and sent 6,127,000 messages. In 1870, 130,000 miles of wire—an increase of 61 per cent., and transmitted 10,932,138 messages—an increase of 92 per cent.

In 1868, the Western Union Telegraph Company had 97,594 miles of wire, and transmitted 6,373,095 messages. In 1872, 137,190 miles of wire, an increase of 40 per cent., and transmitted 10,932,138 messages, an increase of 69 per cent.

The exceptionally favorable results in the operation of the Western Union lines is attributable principally to two causes, the first of which is the great improvement in the condition of the wires, $3,875,210 having been expended since 1868 in reconstructing and repairing them. The second cause for the greater proportional increase in the nnmber of messages transmitted, is to be found in the inauguration, in 1869, of the transmission of messages at night at half rates, by which the wires to a considerable extent have been utilized during the night, when they were formerly but little used. This system of transmitting messages during the night at one-half the day rates is peculiar to this country, and is not in operation in any other country in the world. Among the chief causes which led to the inauguration of the half-rate system, was the constant demands which were made on all sides for additional wires to meet the increasing traffic of the Company, while at the same time those already in use were comparatively idle for the greater portion of the night and the earlier hours of the day. It was apparent that the half-rate plan, if it should meet with success, must necessarily result in either one of two things: the creation and development of an entirely new traffic, or the taking away of a portion of the full-rate business, which was transacted during the day. If it created a new business, which the full rates failed to reach, it would be performing a good service; while, on the other hand, if it secured a portion of the full-rate messages, it would relieve the wires during the busy hours of the day, and make room for the transmission of new full-rate despatches, and thus prevent or postpone the necessity of putting up additional wires for an increased service.

The immediate effect upon the revenue of a reduction in the rates is well illustrated by the experience of the Western Union Company.

On the first of October, 1869, a new air line tariff was adopted, which greatly reduced the rates. During the first month after the reduction took place, there was a decrease in the gross receipts as compared with the same month of the preceding year of $41,385.07, accompanied by an increase in the current expenses of $26,929.26, making a difference in the net profits of $68,314.33. The second month after the reduction in the rates showed, as compared with the same month of the preceding year, a decrease of $7,241.28, accompanied by an increase in the current expenses of $19,001.24, making a reduction in the net profits of $26,242.52. The gross receipts for the third month after the reduction as compared with the previous year, showed a falling off of $37,566.56, accompanied by an increase in the current expenses of $27,239.29, making a decrease of $64,805.80 in the net profits.

On the first of January, 1870, the new half rate tariff for night messages went into operation. The gross receipts for this month were $62,113.21 less, and the expenses $58,452.38 more than for the corresponding month of the previous year, making a decline in the net profits of $120,565.59.

The gross receipts of the fifth month after the reduction were $53,832.48 less; the current expenses $25,924.48 more, and the net earnings $79,756.96 less than for the corresponding month of the previous year.

The gross receipts of the sixth month after the reduction, was $6,686.86 less; the current expenses $11,829.95 more, and the net earnings $18,516.79 less, than for the corresponding month of the preceding year.

The gross receipts of the seventh month after the reduction, were $24,448.54 less; the expenses $16,642.58 more, and the net earnings $41,091.12 less than for the corresponding month of the preceding year.

Thus from October 1st, 1869, when the reduced tariff went into operation, to May 1st, 1870, the gross receipts were $233.273 less, and the expenditures $186.019 more than for the same months of the preceding year, making a reduction in the net earnings of $419,293.

The net earnings of the Western Union Telegraph Company for the year ending June 30th, 1869, were $2,748,801.45. For 1870, $2,227,965.54. For 1871, $2,532,661.66; and for 1872, $2,790,232.61. It thus appears that it took three years for the net revenues of the Company to recover from the reduction in the rates inaugurated in 1869, during which time the Company erected 32,606 miles of wire, opened 1,630 new offices, and increased its annual transmission of messages over 50 per cent. The erection of this large amount of wire, rendered necessary to perform the increased traffic, is not included in the expenses, but was paid for out of the net profits of the Company and the Company has not made any dividend whatever during the past three years.

The following table will serve to illustrate to some extent the great reduction made by the Western Union Telegraph Company during the past five years:

TARIFF FROM WASHINGTON, D C.

To	1868.	1873*.	Percentage of reduction.
Albany, N. Y	$1 15	$0 80	33
Annapolis, Md	45	25	44
Augusta, Ga	1 75	1 00	43
Austin, Texas	5 25	2 50	52
Augusta, Me	1 95	85	56
Boston, Mass	1 35	55	60
Buffalo, N. Y	1 50	90	40
Bangor, Me	1 95	90	53
Burlington, Iowa	2 95	1 75	40
Burlington, Vt	1 75	1 15	34
Bellaire, O	1 45	1 00	31
Cincinnati, O	1 85	1 00	45
Chicago, Ill	2 20	1 00	54
Columbus, O	1 75	1 00	43
Charleston, S. C	1 50	1 00	33
Columbia, S. C	1 50	1 00	33
Cumberland, Md	85	40	53
Central City, Col	7 25	2 50	66
Cape May, N. J	90	65	30
Charlotteville, Va	75	25	67
Council Bluffs, Iowa	4 20	2 50	40
Cheyenne, Wy	8 25	2 50	70
Corning, N. Y	1 30	90	31
Detroit, Mich	1 95	1 30	33
Denver, Col	7 25	2 50	66
Dayton, O	1 75	1 00	43
Dubuque, Iowa	2 90	2 00	31
Galveston, Texas	4 75	2 50	47
Helena, Mont	10 00	2 50	75
Helena, Ark	3 50	2 50	29
Indianapolis, Ind	2 05	1 00	51
Jersey City, N. J	75	40	47
Keokuk, Iowa	3 00	1 75	41
Louisville, Ky	2 00	1 25	37
Leavenworth, Ks	3 55	2 50	30
Little Rock, Ark	3 75	2 50	33
Lynchburg, Va	1 00	40	60
Milwaukee, Wis	2 30	1 10	50
Montgomery, Ala	2 75	1 50	45
Mobile, Ala	3 00	1 75	44
Memphis, Tenn	3 00	1 50	50
New York City	50	40	20
New Orleans, La	3 25	2 00	38
Norfolk, Va	75	40	46
Nashville, Tenn	2 25	1 50	33
New Haven, Ct	1 15	50	56
Newport, R. I	1 50	1 00	33
Omaha, Neb	4 45	2 50	44
Pittsburgh, Pa	1 00	50	50
Portland, Me	1 65	75	54
Providence, R. I	1 25	55	56
Peoria, Ill	2 80	1 50	46
Parkersburg, W. Va	1 45	1 00	31
Richmond, Va	75	25	66
Rock Island, Ill	2 85	1 75	38
St. Louis, Mo	2 45	1 75	28
San Francisco, Cal	7 75	2 50	68
Savannah, Ga	2 00	1 00	50
San Antonia, Texas	5 25	2 50	52
Sioux City, Iowa	4 50	2 50	44
Salt Lake City	7 25	2 50	66
Syracuse, N. Y	1 40	90	35
Toledo, O	1 80	1 30	27
Troy, N. Y	1 58	80	30
Topeka, Kansas	3 80	2 50	34
Wilmington, N. C	1 25	1 00	20

The average reduction for the transmission of day messages to the above offices, with whom Washington transacts 84 per cent. of its business, is 44 per cent., and the average reduction for the transmission of night messages is 73 per cent. On the 1st of Feb-

* The rates in this column are for full paid day messages. Messages are received for transmission during the night at one-half these rates.

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ruary, 1873, all rates, which previously exceeded $2.50, were reduced to that amount.

Upwards of 50 per cent. of the business of the Washington office is transacted with Baltimore, Boston, Cincinnati, Chicago, Louisville, New York, Philadelphia and Pittsburgh, where the average reduction in the rates is over 53 per cent. for the transmission of day messages and 84 per cent. for the transmission of night messages.

Although the receipts of the Post-office Telegraphs in England have not as yet equaled the expenditure, there is no reason why they should not be ultimately self-sustaining, but this does not tend to prove that the union of the Telegraph and Postal Systems in the country would be a wise or profitable measure.

The British Post-office has long enjoyed an enviable reputation. It promptly and satisfactorily carries and delivers letters, at one penny each, through the United Kingdom, and makes a net profit of over five million dollars per annum; while our Post-office charges three cents for carrying a letter, without delivery, except in the larger cities, and manages the business at an annual loss of over five million dollars.

During the past five years the deficiency in the United States Post-office has amounted to $25,114,054, while, during the same period, the net revenue of the British Post-office has amounted to $34,190,717 in gold.

Mr. Ramsey states, in his report, that the total stock and cash dividends of the Western Union Company, since its organization in 1858, is $47,478,736, but he fails to make the still more important statement, that the total cash dividends of the Company, during this term, have only been $8,751,503, the remainder having been expended by the Company in providing additional facilities required by the increased traffic arising from the enormous reduction in the rates, and improving the financial condition of the Company, in anticipation of future remuneration.

The claim that the Western Union Telegraph Company is now, or may hereafter become, a dangerous monopoly, is entitled to no consideration whatever, since, in the first place, the telegraph business is everywhere in this country open to free competition, no one company having any advantage over another, except what it legitimately acquires by the greater skill with which it performs the service; and in the second place, the Act of 1866, which constitutes a compact between the Government and the Western Union Telegraph Company, provides that the United States may at any time after the expiration of five years from the date of the passage of the act, purchase all the telegraph lines, property and effects of the Company at an appraised value, to be ascertained by five competent disinterested persons, two of whom shall be appointed by the Postmaster-General of the United States, two by the Company, and one by the four so previously selected.

The success of the Hubbard scheme would inevitably depreciate the value of the property of this Company, which the Government can at any time take at an appraisal, not of its cost, but of its value. Congress cannot consistently and in good faith confer such a franchise upon Mr. Hubbard without first releasing this company from the obligations of the above act, and providing a just measure of compensation for the depreciation of its property which would result from the granting of such extraordinary privileges to a competitor.

Mr. F. W. Jones has been appointed Sunday manager of the W. U. Chicago office.

EARLY EXPERIMENTS OF MORSE.

A friend of the Journal writing at Boyd, Ky., communicates an interesting extract from an ancient periodical, regarding the early experiments of Prof. Morse in perfecting the electro-magnetic telegraph. He says:

In looking over an old "Peoples' Magazine," printed in Cincinnati in 1838, I found the following notice taken from the "Morristown Jerseyman," which may prove interesting to operators, and teach them not to despise the day of small things. Think of it, ye modern Gods, who work from the Atlantic to the Pacific, of transmitting a spark a "distance of two miles instantaneously":

"Prof. Morse's Electro-Magnetick Telegraph.—It is with some degree of pride that it falls to our lot first to announce the complete success of this wonderful piece of mechanism, and no place could have been found more suitable to pursue the course of experiments necessary to perfecting the detail of machinery than the Speedwell Works. Replete, as they are, with every convenience, Professor Morse quietly pursued the great object, and has finally succeeded. Others may have suggested the possibility of conveying intelligence by electricity, but this is the first instance of its actual transmission and permanent record. The telegraph consists of four parts. 1st. The *battery*. A Cruikshank galvanick trough of sixty pair of plates, seven by eight and a half inches each. 2d. The *portrule*. An instrument which regulates the motion of the rule. The rule answers to the *stick* of the printers, and in it the type representing the numbers to be transmitted are passed beneath the lever which closes and breaks the circuit. 3d. The *register*. An instrument which receives and records the numbers sent by the portrule from any distant station. 4th. A *dictionary*. Containing a complete vocabulary of all the words in the English language regularly numbered. The communication which we saw made through a distance of two miles was the following sentence: '*Railroad cars just arrived; 345 passengers.*' These words were put into numbers from the dictionary; the numbers were set up in the telegraphick type in about the same time ordinarily occupied in setting up the same in a printing office,

"They were then all passed complete by the portrule in about half a minute, each stroke of the lever of the portrule at one extremity working on the register at the other, a distance of two miles, instantaneously. We watched the spark at one end and the work of the pencil at the other, and they were as simultaneous as if the lever itself had struck the mark. The marks or numbers are easily legible, and by means of the dictionary were resolved again into words.

"The superiority of this telegraph over all hitherto invented is, that day or night, in clear or in foggy weather, intelligence can be sent instantaneously.

"The advantages to the government and the country of such a means of communication are incalculable."

UNDERGROUND TELEGRAPH WIRES.

A recent heavy rain, followed by a severe frost in this city, played great havoc with the telegraph wires. The weight of ice was so great as to cause innumerable breaks, so that the elaborate fire alarm system became useless, and for a time it appeared as if communication with other cities was to be seriously interrupted. This has caused a re-agitation of the subject of underground wires, which, it is justly believed, would prove of great advantage as compared with those now in use. Not only would the unsightly telegraph poles be removed from our streets, but such casualties as the above, due to the weather, would be permanently averted.

Professor Silliman, in a recent letter, points out some of the difficulties incident to the underground plan. He says that gutta-percha covering will not answer for insulation where it is exposed to the action of moist earth and vegetable processes. An element also, that is to be carefully considered in carrying out a general system for underground telegraphs in cities, is the facility that must be given for relaying in case of accident or of excavations in the streets for constructive purposes. If, however, says the Professor, the wire is once properly laid underground, in insulatory material, proof against natural agencies of destruction, the "electrical leakage" is very small, so much smaller than is possible with wires in the air as to be a great saving to the telegraph company. —*Scientific American.*

CUTTING WOOD BY ELECTRIC HEAT.

The following item is going round the press:

"A curious invention has just been patented for cutting wood without a saw. A galvanic current, in sufficient quantity, when passed over fine platinum-wire, raises its temperature to a white heat. The inventor discovered that wood, a comparatively dry substance, even when green, could be cut in the same way. By arranging the wire with handles, or other means, so as to guide it readily, trees, logs or planks may be cut as desired. There is here, therefore, a simple and easily applied force, which may be employed to fell trees, divide them into logs, and perform all the operations of the saw and ax. The surface is slightly charred, but the black layer is very thin. The battery employed need only be of the simplest character."

We remark to this, that the heat produced by a voltaic battery has several years ago been used for heating a platinum-wire, and applying this in place of a knife in surgery. The inventor probably saw a surgeon use such a wire to amputate a tumor, and then the idea flashed upon his mind to patent the cutting of trees in this way, without stopping to think of the great expense of a sufficient battery, which is of no consequence where surgical operations are to be performed, and the saving of human life is involved, but is of great importance in cutting lumber. The statement that "the battery employed needs only to be of the simplest character" is an illusion; it may be simple, but it must consume considerable zinc and acid. If the electric current, and the consequent heat, could be obtained in a cheaper way, this method might compete with the saw and ax, which are now and will long remain the cheapest means. Theoretically, however, the use of a steam saw is a roundabout method; by means of the combustion of coal heat is produced, by means of steam this heat is by more or less complex machinery changed into the motion of the saw, and this motion separates the wood fibre by mechanical force, while the application of a heated platinum wire makes the heat itself directly perform the work of separating the fibres.

Experience has proved that electric light and heat can be cheaper produced by the rotation of a magneto-electric machine, ran by a steam-engine, than by a battery, and for this reason some light-houses are illuminated in this way; this is, therefore, an economical improvement on the patent mentioned above; but it is evident that even this improvement can be no true economy. To cause a steam engine to run a magneto-electric machine to heat a wire, and cut with this, in place of letting the steam engine run simply a saw, must cost more.

There is still another way of producing an electric current direct by heat of combustion, namely, with a thermo-electric battery, which does not involve the intervention of a moving engine. Improvements in this direction are confidently expected by all who have watched the tendency of the progress in electric science. Some time ago some kind of thermo-electric stoves were used for electroplating, but they recently have been rejected to make place for the latest improved magneto-electric machines, driven by steam power.—*Manufacturer and Builder.*

The Boston *Globe* says: "And now there is an epidemic of railroad accidents in all directions, postal telegraphy is the next great step to be achieved by Congress.

The *Globe* doesn't explain what connection exists between epidemic accidents and postal telegraphy, but doubtless they are to be regarded as public misfortunes of about the same gravity.

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—o—

A Telegraphers' Employment Bureau has been established in this city, under the direction of several well known Telegraph Superintendents, having for its object the reception of applications for positions as operators, or operators and clerks or agents combined.

Applicants must state:

1st—Age. How long in the service. Reason for changing position. Present Salary. Sound or paper reader. Able bodied or otherwise.

2d—Applicants must send recommendations from present employer, or if not at work, from former employer as to moral character and capabilities. Recommendations to state if applicant is capable of filling positions other than operator, such as ticket agent, freight clerk, or agent.

This list will be published monthly and forwarded to the Superintendents of Telegraph Lines and a copy sent to each applicant whose name is printed thereon. All names to be published two (2) months. All applications to be accompanied by a fee of two (2) dollars.

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TOLEDO, O.

THE

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SPECIAL NOTICE.

OFFICERS OF RAILROAD COMPANIES, and others interested, are notified that this Company is the sole owner of the ORIGINAL PATENT for operating

ELECTRIC SIGNALS

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J. N. ASHLEY,
Business Manager,
194 FULTON STREET, N. Y.

December

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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 7. NEW YORK, MARCH 1, 1873. WHOLE NO. 128.

ON A MODIFIED FORM OF "WHEATSTONE'S BRIDGE," AND METHODS OF MEASURING SMALL RESISTANCES.

BY G. C. FOSTER, F. R. S.

The object of this paper is to describe simple methods for the following purposes connected with the measurement of electrical resistances, namely :—

I. The measurement of small resistances, by ascertaining what length of a graduated standard wire has an equal resistance.

II. The electrical 'calibration' of wires, or the division of them into lengths of equal resistance.

III. The elimination of errors due to the resistance of connections from determinations of specific resistance.

It will be seen from what follows, that the arrangement of apparatus employed for these purposes might be varied in many ways, but it will probably conduce to clearness if I confine my description to the arrangement that I have actually used. In all the experiments, the principal piece of apparatus, besides a battery and a galvanometer, was a Differential Resistance Measurer,—or, as it is commonly called, a "Wheatstone's Bridge,"—of the form usually made by Messrs. Elliott Bros., for purposes of demonstration and research ; and, as I shall have to make frequent reference to this instrument, it may be well to give a brief description of it before speaking of the special purposes to which it has been applied.

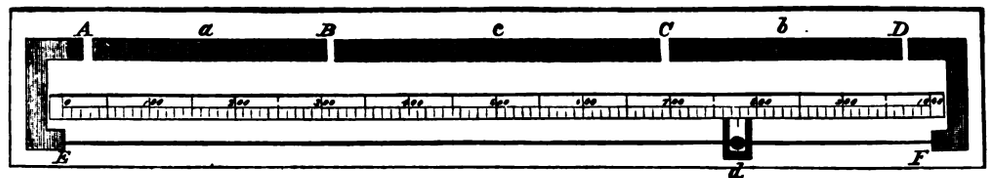


Fig. 1.

Fig. 1 shews the arrangement of its essential parts on a scale of about ½. A piece of german-silver wire, E F, from 1.5 mm. to 2 mm. in diameter and 1 metre long, is stretched upon an oblong board forming the base of the instrument, parallel to a metre-scale divided throughout its whole length into millimetres, and is so placed that its two ends are approximately opposite to the divisions 0 and 1,000 respectively of the scale. The ends of the wire are soldered to a broad copper band, which passes round each end of the graduated scale and runs parallel to it on the opposite side from the wire. This band is interrupted by four gaps, A B C and D, at each side of each of which is a binding screw for connecting the conductors, whose resistance is to be measured. In the ordinary use of the apparatus, the wires from the battery are attached to the screws *a* and *b*, fixed upon the copper strips, A B and C D respectively, and the galvanometer wires are connected, one to the screw *c* on the strip, B C, and the other to the screw *d* upon a moveable block, which slides along the graduated scale and allows contact to be made at any part of the german-silver wire, while an index-mark shows the distance of the point of contact from each end of the scale. The conductors to be compared are inserted at the two middle gaps, B and C, and if they are of small resistance, the end gaps, A and D are usually closed by thick copper latches, or, if the resistances at B and C are considerable, conductors, whose resistances are known in terms of that of the wire, E F, are inserted at A and B ; it is easy to see that the effect of these, which may be regarded as ungraduated prolongations of the german-silver wire, is to increase the delicacy but to limit the range of the instrument. When the moveable contact *d* has been so placed that, on completing the battery-circuit, the galvanometer shows no deflection, it follows from the general principle on which the measurement is founded that—

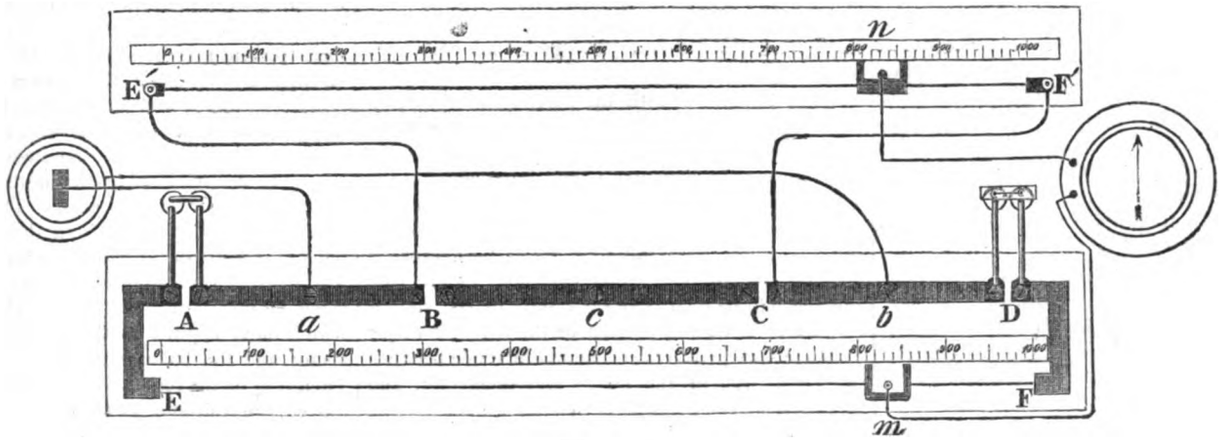


Fig. 2.

resistance *a* to *c* : resistance *c* to *b* = resistance *a* to *d* : resistance *d* to *b*. In most cases we may substitute for this, as a fair approximation,—

resistance at B : resistance at C = resistance E to *d* + resistance at A : resistance *d* to F + resistance at D, or

$$\text{—scale reading} + \left\{\begin{matrix}\text{length of wire equal}\\ \text{in resistance to A}\end{matrix}\right\} : 1{,}000$$

$$\text{—scale reading} + \left\{\begin{matrix}\text{length of wire equal}\\ \text{in resistance to D}\end{matrix}\right\};$$

but in adopting this last value as representing the ratio of the resistances at B and C, we are exposed to sources of error which need not be pointed out to any one accustomed to electrical measurements, and which become of greater importance in proportion as the resistances to be compared are smaller. These errors are almost entirely avoided in the process now to be described.

The resistance of any wire, whose resistance is less than that of the whole length of graduated german-silver wire, E F, may be found in terms of the latter as follows:—Insert the wire to be measured at the gap A, close the gap D by a conductor of insensible resistance, and insert at B and C any two convenient conductors, the ratio of whose resistances (which it is not necessary to know) does not differ from unity more than does that of the resistance to be measured and the resistance of the whole wire E F; then shift the moveable contact *d* until the galvanometer ceases to be deflected, and take the reading of the scale. Next put the wire to be measured at D and close the gap A by a conductor without sensible resistance; shift *d* until the galvanometer is again balanced, and take a second reading of the scale : *the difference of the two scale-readings gives the length of the wire* E F, *whose resistance is equal to that of the wire to be measured.*

This result is almost self-evident, but it may be proved, if needful, thus :—Let L denote the total resistance of the wire E F, A and D, the resistances inserted at the two end gaps, *e* and *f*, the resistances of the copper bands between *a* and E, and between *b* and F respectively, and let B and C stand for the total resistances between *a* and *c*, and between *c* and *b* respectively ; also let *m* be the scale-reading when the resistances A and D are in their first positions, and *m'* the reading when they have been interchanged ; lastly, let *k* be the resistance of unit length (1 millim.) of the wire E F. Then the two experiments give—

$$\frac{B}{C} = \frac{A + e + mk}{L - mk + D + f}$$

and

$$\frac{B}{C} = \frac{D + e + m'k}{L - m'k + A + f}$$

whence, by equating the two values of $\frac{B}{C}$ and adding unity to each side of the equation, we get :—

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$$\frac{A + D + L + e + f}{L - mk + D + f} = \frac{A + D + L + e + f}{L - m'k + A + f},$$

or

$$A - D = (m' - m)k$$

In the measurement described above, we assumed the condition $D = 0$; if m_0 and m'_0 be the scale-readings corresponding to this condition, we have—

$$A = (m'_0 - m_0)\,k.$$

But, since in practice the resistance D can never be reduced absolutely to nothing, it is important, when great accuracy is required, that its value should be known: a method is given further on by which any resistance great enough to affect sensibly the reading of the instrument can be measured.

In order that measurements made in the manner that has been described may have a definite meaning, it is of course necessary that the value of the coefficient k, or the resistance of unit length of the wire E F should be known with reference to some recognized standard; and when, as in the instrument I have chiefly used, the resistance of the whole wire E F is a comparatively small fraction (about $\frac{1}{2}$) of a unit, some special method is needed for measuring k.

I have employed two methods for this purpose, the one which is, on the whole, the most convenient being the following: A wire, whose resistance, R, is only a little less than that of the whole wire, E F, is measured in terms of the latter by the process given above: let p be the number of millimetres between the two readings of the positions of the sliding contact, then

$$k\,p = R \ldots\ldots (1)$$

Next, a standard (unit) coil of resistance, S, is combined in multiple arc with the wire already measured, and the measurement is repeated; this gives, if q be the number of millimetres between the two readings in this case:

$$k\,q = \frac{R\,S}{R+S} \ldots\ldots (2)$$

Whence we get, as the value of the coefficient required,

$$k = S\frac{p-q}{p\,q}.$$

Another method is to insert a standard coil at one of the gap ends (say at A), and at the other (D) a wire whose resistance, R, falls short of that of the standard by not quite the whole resistance of E F, and to shift the moveable contact until the galvanometer is balanced; then to interchange the standard and the resistance, R, and shift the contact again till the balance is restored: let d be the difference (in millimetres) between the two readings of the scale in this experiment. Next, take a second wire whose resistance, R_2, falls short of that of R_1 by nearly the whole resistance of E F, and proceed with this and the first wire in the same way as with the first wire and the standard, and let d_1 be the difference between the two readings of the scale in this case. Proceed in this manner with wires of smaller and smaller resistance until one is arrived at of smaller resistance than the wire E F. Let the resistance of this wire be R_n: by inserting it at one of the end gaps and an insensible resistance at the other, and afterwards interchanging, we find, by taking the difference, d_n, of the scale-readings in the two positions required to balance the galvanometer, the number of millimetres of the graduated wire whose resistance is equal to R_n. By a set of such experiments we obtain:

$$\begin{aligned} d\,k &= S - R_1, \\ d_1 k &= R_1 - R_2, \\ &\vdots \quad\quad \vdots \\ d_{n-1} k &= R_{n-1} - R_n, \\ d_n\,k &= R_n; \end{aligned}$$

or

$$k = S\frac{1}{d + d_1 + \ldots + d_{n-1} + d_n}.$$

It has been tacitly assumed in the foregoing that the coefficient k, or the resistance of 1mm. of the graduated wire E F, is constant from end to end. This, of course, is never strictly the case, and hence it is desirable to measure not only the mean value of this coefficient for the whole wire, but also its value for the different parts, or else to assure ourselves that the variations of value are too small to be of importance. This examination of the wire is very readily made by the arrangement represented in Fig. 2, which shews a second graduated wire E′ F′ connected with a "Bridge" of the form already described. So far as the same reference-letters occur in this figure and in Fig. 1, they mark identical parts: the battery is connected (through a make-and-break key not shewn in the diagram) with the binding-screws a and b, and the terminals of the galvanometer are connected with *two* moveable contact-makers, one of them m on the principal wire E F, and the other n on the wire E′ F′—for convenience of reference this will be afterwards called the "compensating wire" or "compensator"—the ends of which are connected with the outer binding-screws of the gaps B and C. The end gaps A and B are closed, the one by a short and very thick piece of copper wire of almost insensible resistance, and the other by a short piece of german-silver wire of resistance equal to that of whatever length of the graduated wire it is desired to test at once. This piece of wire serves the purpose of a gauge with which each part of the wire E F is compared in succession: in most of my experiments its resistance was equal to that of about 70 mm. of the wire to be tested. The gauge being (say) at the right-hand gap D (as in the diagram) the sliding contact m is placed at or very near to the right-hand end of E F, and the slider n is moved on the compensating wire so as to destroy the deflection of the galvanometer. The gauge and the thick copper connector are next interchanged, and the balance is restored by moving the slider m: as already pointed out the length of E F over which the slider is moved, is that of which the resistance is equal to the difference between the resistances of the gauge and the thick connector. The gauge and connector are now put back into their first positions, and the slider n is shifted until the galvanometer is again balanced; then they are interchanged once more and the balance obtained by shifting the slider upon E F. This process of successively interchanging the gauge and connector, and adjusting the galvanometer to zero, by moving alternately the sliders m and n, is continued until the former has been brought step by step to the further extremity of the wire E F. It will be seen that each shift of the sliding contact m is over a portion of the wire E F whose resistance is equal to the constant difference between the resistances of the gauge and connector, and therefore that, by the process that has been described, the graduated wire is divided into parts of equal resistance, in a manner exactly comparable to that in which a thermometer-tube is "callibrated," or divided into portions of equal capacity, by marking on it the lengths successively occupied by a small quantity of mercury which is pushed along it.

The shift of the slider n also takes place over portions of the wire E′ F′ which have all an equal resistance, but this bears the same ratio to the resistance represented by the shifts of the slider m that the resistance of the branch a B E′ F′ C b bears to the resistance of the branch a A E F D b. To prove this, let the sliders be so placed that the galvanometer is in equilibrium when the gauge is at the gap D, and the gap A is closed by the thick connector: let the resistance of the gauge be denoted by G, that of the connector by C, the resistances of the wires E F and E′ F′ by L and L′ respectively, those of the permanent connections between a and E and between a and E′ by e and e', the permanent resistances between b and F and between b and F′ by f and f', and lastly the resistances of E m and E′ n by r and r'. We then have the equation—

$$\frac{C + e + r}{G + f + L - r} = \frac{e' + r'}{f' + L' - r'} \quad \ldots\ldots (1)$$

Then, by interchanging the gauge and connector, and balancing the galvanometer again by moving the slider n nearer to F′, while the slider m remains where it was, we get the equation—

$$\frac{G + e + r}{C + f + L - r} = \frac{e' + r'_1}{f' + L' - r'_1} \quad \ldots\ldots (2)$$

where r'_1 is the resistance between E′ and the new position of n, and therefore $r'_1 - r'$ is the resistance of that portion of the compensating wire over which the slider has been moved. By adding unity to each side of each of the equations (1) and (2), inverting the two new expressions thus obtained, and subtracting one from the other, we get—

$$\frac{r' - r'}{e' + f' + L'} = \frac{G - C}{G + C + e + f + L}$$

or

$$r_1' - r' = (G - C)\,\frac{e' + f' + L'}{G + C + e + f + L}; \quad \ldots (3)$$

which shews that, with the same apparatus, at each shift of the moveable contact along the compensating wire, it passes over a constant resistance of the magnitude stated above.

The value of the multiplier of G — C in equation (3) is easily found experimentally; for, since the resistance passed over at each shift of the slider on the principal wire E F, is equal to the difference G — C, denoting this resistance by $r_1 - r$, we obtain—

$$\frac{e' + f' + L'}{G + C + e + f + L} = \frac{r'_1 - r'}{r_1 - r} = M.$$

By help of this value, which for shortness may be denoted by M, exceedingly small resistances, such as that of the short copper connector mentioned above, are readily measured when they are connected so as to form part of the principal circuit. For this purpose, it is sometimes needful (in order that every measurement may come within the range of the instrument), to transfer the battery-wires from the binding-screws a and b to E′ and F′; when that is done, the factor M must be determined in this state of the apparatus, since the resistances e' and f' now belong to the principal branch of the circuit, instead of to the compensator branch. The galvanometer wire is now disconnected from the slider m and applied to one end of the connector (or other conductor whose resistance is to be measured) and the balance is got by means of the slider n; the galvanometer wire is next applied to the other end of the connector, and the balance is again got by the slider. Then if Q be the resistance over which the slider is moved, the resistance of the connector is given by—

$$C = \frac{Q}{M}$$

As an example of the resistances which are easily measurable in this manner, it may be mentioned that in two experiments the resistance of a thick and short piece of copper wire was found to be equal to that of 0·6 millimetre of the german-silver wire E F, or to be about 0·00008 of a B. A.-unit.

When the graduated wire of the bridge has been divided as above described into sections of equal resistance, it is of course easy to make a table showing what fraction the resistance of any given part of it is of the total resistance. The manner of doing this is too obvious to need further description. For the

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sake of comparison, a table was made by the above process for a bridge-wire which had become very irregular through rough usage, and a similar table was made for the same wire from the results obtained in comparing together by means of it, in the usual way, a set of coils of known resistances. The numbers obtained by the two processes were almost identical; but I consider, nevertheless, that the method of the compensating wire and gauge possesses some advantages, since it does not depend upon the accuracy with which a set of resistance-coils have been previously adjusted, and the numerical calculations required are so simple that there is little danger of arithmetical error.

A method for the purpose of avoiding errors due to the resistance of connections in determinations of specific resistance, has been described by Sir William Thomson (*Proc. Roc. Soc.*, [1861] vol. xi., p. 313), but probably a simpler and equally accurate process is to connect the wire to be used for the determination, in the place of the german-silver wire E F of a bridge of the form shewn in figure 1, and to proceed precisely in the manner already indicated, for the measurement of the resistance of the unit length of the bridge-wire. The result is in this case wholly independent of any resistance outside the extreme positions of the sliding contact-maker, and since this is only used for finding a point which gives *no current* through the galvanometer, the result is also unaffected by any moderate variation of resistance at the movable contact itself. I do not think there could be any great difficulty in arranging the apparatus so as to admit of the wire between E and F being immersed in a bath of liquid, so that its temperature might be known with greater accuracy than is possible when it is exposed to the air, but I have made no attempts in this direction.

It will be seen that the accuracy of the methods of measurement described in this paper, depends essentially on the possibility of connecting the conductors inserted at the two gaps A and D with the rest of the apparatus in such a way, that they can be taken out and put back again time after time, without causing any perceptible change in the resistance of the connections. In this respect, I have found the use of well-amalgamated copper rods, resting by their flat ends on an amalgamated plate of copper, forming the bottom of a mercury-cup of the form devised (I believe) by the late Dr. Matthiessen, and described by him and Mr. Hockin (*Rep. Brit. Assoc.*, 1864, p. 354), quite satisfactory.

OBSERVATIONS DURING THE RECENT ELECTRIC STORM.

The Chicago *Inter-Ocean* contains the following account of the electrical phenomenon which accompanied the great storm of January 7th and 8th, communicated by Mr. C. H. Summers, electrician of the Western Union Telegraph Company.

"The disturbances were first noticed on the wires in Central Iowa. The lines leading west were rendered useless for the transmission of messages, owing to an incessant discharge of electricity, increasing in intensity until it would leap from one strap of the switch board to another, across the intervening space, and then, in a luminous stream, the ground plate of the lightning arrester. Another singular fact observed was that, on some routes where a number of wires occupied the same poles, one wire alone was highly charged, or so affected that to work it was an impossibility, while all the others were entirely free from any external influence. In some cases the wire occupying the top of the pole would apparently receive the whole charge; in others, the bottom wire would be affected, and in a few cases the charge was equally distributed among all the wires. In the Chicago office the effect was similar to that observed in Iowa, and every observation confirmed the opinion that the centre line of the storm was due east from Des Moines, Iowa, to Detroit, Mich., narrowing in its limits north and south as it approached the latter place, where it arrived on the evening of the 8th ult., and rapidly subsided. A high wind, varying from twenty-five to twenty-eight miles per hour, accompanied the storm.

At the Eastern slope of the Rocky Mountains a similar phenemenon has been frequently witnessed upon a wire running north and south, but rarely on an east or west wire. Mr. Summers ascribes it to the fact that, under the theory that the earth is charged with electricity negative to the atmosphere, there must be a point where discharge occurs or nutralization takes place. At points where the relative humidity of the air is very great this is doubtless ever silently going on, but during seasons of intense cold, when the air is necessarily dry, the combination is evidently rendered more difficult and the tension thereby greatly augmented. If, under these circumstauces, good conductors, such as telegraph wires, are interposed, they would certainly assist in carrying a good part of the atmospheric charge to a point where the electric tension was far less. What the electrical condition of the telegraphic wires on the same pole was, to render one more susceptible than another to this inductive influence, or why wires running in other directions than east and west should not have been similarly affected, are problems yet unsolved. A recurrent storm, it is hoped, will afford an opportunity for more extended and acute observation."

MANUFACTURE OF SUBMARINE TELEGRAPH CABLES IN SAN FRANCISCO.

The manufacture of wire rope has been carried on for some time in this city, but until recently no attempts have been made to manufacture submarine telegraph cable, and in fact there has been little need for it here until the past few years. We paid a visit this week to Hallidie's Wire Rope and Submarine Telegraph Cable Works, on the corner of Vallejo and Sansome streets, San Francisco, to see a cable that was being made for the Electrical Construction and Maintenance Company. The premises occupy a fifty-yard lot near the water, and in a convenient place for shipping. The main building is two stories in height, the lower story of which is used for the machinery, and the upper for a loft or place for fitting ropes, etc. There are three wire rope-making machines of different sizes in the building, besides the one used for making the cable. While there we saw a three-inch wire rope 300 feet long, made in nine minutes. Of course the bobbins, etc., were previously prepared.

The cable is made on one of Bowden Bros' horizontal cable machines of twelve spindles, constructed at Newcastle-on-Tyne, England. A piece of cable two miles long has just been shipped, and the piece being made will, when finished, be 13,200 feet, or about two and half miles in length. The core consists of seven No. 22 copper wires thoroughly insulated up to 5-16 of an inch in diameter, covered with gutta-percha and Chatterton's compound; over this is a layer of canvass and rope yarn, measuring in all 9-16 of an inch; outside of this core are twelve No. 9 galvanized iron wires, each of which has a tensile strength of 1,500 pounds. When finished the cable is about one inch in diameter, and weighs in round numbers four-fifths of a pound to the foot. The gross weight of the cable and reel upon which it is wound, for the one length of two and a half miles, will be 13,000 pounds. The factory with its present machinery can turn out a mile of cable in a day of ten hours. They recently made 12,000 fathoms in a single night.

In making the cable, the core passes through the hollow shaft on the machine, and, meeting the wires at a central point, is covered by them. The twelve bobbins revolve around a common centre and the rope is drawn on to the reel by gearing attached to the reel. Considerable care is required to keep an exact strain on all the bobbins, for if one wire breaks, the machine has to be stopped in order to join the ends.

This enterprise is of course as yet only in its infancy, but the proprietor hopes to extend his business ultimately to greater proportions. In fact, the main cause of its foundation is that they are in hopes of being able to make the China and other cables for the Pacific. The great danger to be apprehended in the transportation of submarine cable is from the change of temperature in crossing the tropics, as shown by the experience of the Red Sea and Panama cables. The only safe way is to lay it in large tanks filled with water. The reason why the Atlantic cable was so successful was that it was put down in a favorable season with no extreme heat, and is, moreover, in a northern latitude. If a cable to run to China were built in the Eastern States and shipped here, it would have to be carried across the tropics twice, and it would be impracticable to put large lengths on cars and then reship it into vessels. Therefore, it will be much more economical, and at the same time more convenient, to have these cables made here, and this factory will be able to make them. In such a case, of course, appropriate machinery will be supplied for turning out large pieces.

The factory employs at present fourteen men. The engine and boiler are in a shed adjoining the main building. Large scales are placed in a convenient position for weighing the wire, etc., and there is a commodious yard with storehouses for surplus stock, etc. The wire ropes for mining purposes, etc., are not generally made of galvanized wire, but of common wire, which receives a coating of Stockholm tar. The tar in the tanks is heated by steam, to avoid the use of fire on the premises as much as possible. We saw at the factory the old hoisting rope of the Amador mine, which has been lying since the fire at the bottom of the shaft. It is now being repaired and straightened, a thing which seems almost impossible, as it was twisted and unwound in every direction, and was covered with rust. They have made at this factory wire ropes 4,000 feet long. The establishment is very complete, and may be ranked as one of the rising industries of the State.—*Mining and Scientific Press.*

New Electrical Discovery.—Dr. Blake, of the San Francisco Academy of Science, and Judge Hastings, of the California State Geological Survey, announce the discovery of a current of electricity running north and south at a distance of about 150 miles from the Pacific coast, along a belt of metallic deposits, which serves as a conducting chain between the poles.

The dip or inclination of the magnetic needle was discovered in 1576, by Robert Norman, an optician of London. He first constructed the dipping needle.

The Shah of Persia has just conferred upon Mr. Carl Siemens the Order of the Lion and Sun, in consideration of the services he has rendered to electrical science generally, and of his efficient maintenance of the telegraph lines in Persia in particular.

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CORRESPONDENCE.

To the Editor of the Journal of the Telegraph.

CIRCLEVILLE, O., Feb. 12, 1873.

Will you please tell us by what rule twenty second (referring to date) is counted two words. I have been beaten in maintaining it in controversy at my office counter. If you can inform me the reason it is so counted, I shall be pleased.

The fact that we do so count it don't make it right. I would like to see this matter discussed a little. Our best scholars maintain it is one word. It looks to me very like a compound word, and to be so counted under Rule 9. The question is open for discussion. Is twenty second, when used to denote a date, one word or two ; if two, by what authority or rule ?

S. WARD, *Manager.*

Answer.—This is a very simple matter. The authority for calling "twenty second" two words, when used to denote a date, or for any other purpose, is, because it is two words. It is not a compound word; it bears the same relation to the days of a month as the date of a year does to an era. You would hardly count "eighteen hundred and seventy-three" as one word; yet, in its relation to the Christian era, it would be as correct to do so as to count twenty second in its relation to the days of a month.

CRAWFORD Co., Pa., Jan. 16, 1873.

To the Editor of the Journal of the Telegraph:

Can you give us, through the JOURNAL, any remedy for *poor* Daniell Porous-Cups. Three-fourths of all the cups we get are, indeed, poor ones ; so thick and hard, apparently, that a very weak current only gets through them ?

I have *one* that has been in use for years, and to-day that one cell produces *more* strength of current than all three others used in the office.

I know it is in the porous-cups, for this one works the same when changed to other jars.

Please tell us if there is not some solution or treatment to make every new porous-cup equal to a FEW that we get? Very truly,

H. C. B.

Answer—Soak the porous-cups in pure soft water.

MARLIN, Fall Co., Texas.

To the Editor of the Journal of the Telegraph:

Will you be kind enough to to give me the information herein required in regard to sending messages, viz. : I sent a message to New Orleans, tolls being $1.25 for full rate ; the party desired an answer, for which I collected $1.25 for an answer of ten words. The answer came with twenty-eight words, and the party refused to pay for the additional eighteen words. Who is to lose the tolls for the amount that should have been paid—$1.24?

Please reply in your next issue, and oblige

R. E. PARNELL, *Manager.*

Answer—The sender of the original message is responsible for the whole tolls of the answer. If you cannot collect the unpaid balance from him, make a statement to that effect, and return it with your monthly account. Of course, any party who should refuse to pay the balance of the tolls, under the circumstances presented by you, would decline to meet any other obligation, and, generally speaking, would be a person of such questionable appearance as would indicate a necessity for persons doing business with him, to exercise more than ordinary care, and it would be well, in such cases, to direct the messenger not to deliver the answer until the tolls were paid.

LEXINGTON, O., Feb. 18th, 1873.

To the Editor of The Journal of the Telegraph:

As you are constantly advising us to ask for information of what we do not exactly understand, and if informing me will not take up too much of your valuable time, I would like to be informed as to delivery of messages beyond the ordinary office limits, which is one-half mile per Rule No. 58. Part of Rule No. 10 reads, "managers may, &c;" and again part of Rule No. 58 reads, "In no case must a greater charge be made for such service than the amount disbursed." I have had several complain of being overcharged for such service. Now, if I receive a message for delivering and the amount received for transmitting the same does not exceed 55 cents, and the message is guaranteed ; what am I to do in this case? Surely I could find no person to deliver it for the above amount, as the conveyance might cost twice the amount received for transmitting the same. Does not part of Rules No. 10 and No. 58 conflict? BURKE.

Answer.—The rules do not conflict. The amount disbursed means the actual expense incurred in the delivery of a message; It has nothing to do with the tariff charges for transmitting over the wires.

VICTORIA, TEXAS, Jan'y 7th, 1873.

To the Editor of The Journal of the Telegraph:

According to Rule Twelve (12) "Transient persons sending messages which require answers must deposit in advance an amount sufficient to pay for a reply of ten words." Now, if it is not too much trouble, please inform me through the JOURNAL, how long should managers hold the amount so deposited? By so doing you will greatly oblige. A BEGINNER.

Answer.—Where parties have deposited money for an answer and none is received within a reasonable time, send a despatch to the office to which the orginal message was addressed, stating that the party who has deposited the money for an answer demands the amount returned, and that, unless the answer is received within a specified time, it will be returned, and that your office will not be responsible for the tolls upon the answer after such time.

URSA, Ill., Jan. 22, 1873.

To the Editor of the Journal of the Telegraph:

What is the price and from where would I order the "Standard Register," illustrated in No. 14, Vol. 5, of the JOURNAL? F. C. W.

Answer.—This instrument is manufactured by the Western Union Telegraph Company, for use in the Western Union offices, and can be ordered through the supply department ; it is not for sale.

To the Editor of the Journal of the Telegraph:

I am anxious to be informed, through the columns of the JOURNAL, upon the manner and principle a number of locals can be arranged so as to work independent of each other from one battery of two poles only. This, I believe, is now being the case in large telegraph offices, but I have not yet seen them at work. I have often heard of it, but have never found any one to readily explain it. By giving this your attention, you will oblige

TELEGRAPHIC INQUIRER.

Answer—Nothing is gained by working more than one wire from one local battery, but, on the contrary, there are many objections to the plan, and it never should be resorted to. The method of doing it, however, is to connect the zincs of several cups together for one pole, and the coppers of several cups together for the other pole, thus making a battery of large surface.

YORK, Pa., Feb. 7, 1873.

To the Editor of the Journal of the Telegraph:

For the benefit of all interested, please announce through the columns of the JOURNAL "What constitutes an answer to a message?"

GEO. W. SHOCH, *Manager.*

Answer—An answer is a reply, a rejoinder, or response.

To the Editor of the Journal of the Telegraph:

In JOURNAL of January 31, I see you render decision to "Dominick," that Rule No. 13, properly construed, means that one-half the "*usual*" rate charged for notification of the delivery of a message, is one-half the "*usual*" rate for ten words. Now, I hope I may be pardoned for differing with you as to the literal meaning of the Rule, whatever may have been its intended meaning, and my argument for this difference of opinion is this : if, as you say, it was intended that "one-half the '*usual*' rate" should be interpreted, one-half the rate for ten words, why was not ten words mentioned ?

In Rule No. 12 it says, "Transient persons sending messages which require answers must deposit in advance an amount sufficient to pay for a reply of ten words." Now in *this* Rule, ten words was meant and specified on the heading of blank No. 2, which is a contract between the public and our company, we are instructed, that "one-half the '*regular*' rate is charged, in addition, for repeating" back messages sent ; does this mean one-half the rate for ten words, or does it mean as is customary to be charged, one-half the rate for whatever number of words there may be in the message under immediate consideration, whether said message contains ten or one hundred words? What now, if you please, is the difference in the definitions of the words "*usual*" and "*regular*" when applied as quoted?

To state the case we will say, that the "*regular*" rate to Philadelphia for ten words is 30c., one-half for repeating back 15c., total 45c. The "*usual*" rate to Philadelphia for ten words is 30c., is it not ? one-half the usual rate for notification of delivery 15c., total 45c.; so far, then, "*regular*" and "*usual*" mean the same thing. The regular rate to Philadelphia for one hundred words is $2.10, one-half for repeating back, $1.05, total $3.15. What is the "*usual*" rate for one hundred words to Philadelphia ? is it any less than $2.10, and is half that "*usual*" rate 15c. Do not the words "usual" in Rule 13, and regular in the form of contract mean one and the same thing ? or does "*usual*" mean ten, and "*regular*" an unlimited number of words? As you say, it is of the utmost importance that the public should be made to clearly understand this matter, and in order that we who deal directly with the public, may express ourselves understandingly, will you please give us the course of reasoning by which you arrive at your definition of the word "*usual.*"

"ENQUIRER."

Answer.—There seems to be no difficulty in understanding Rule 13. It is the information which is furnished by the manager of the office to which the message is transmitted, for which half the usual rate is charged; and when such information is conveyed in ten words or less, only one-half of the usual rate for a ten-word message should be collected. If such information should contain more than ten words, then, of course, one-half of the usual rate upon such excess would also have to be collected.

W. W. S.—Address R. R. Haines, Superintendent Western Union Telegraph Company, San Diego, Cal.

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FOREIGN TELEGRAPHIC ITEMS

THE EASTERN TELEGRAPH COMPANY.

At the half yearly meeting of the Eastern Telegraph Company, held in London on Friday, Jan. 24th, the report of the directors stated that the different sections of the cables continued in good working order. To carry out the objects sanctioned by the meeting of the company on the 6th of December, 1872, 30,000 of the unissued shares had been fully subscribed for by the shareholders. The manufacture of the Falmouth and Lisbon duplicate cable, by the Telegraph Construction and Maintenance Company, was being rapidly proceeded with, and it was anticipated that the line would be laid and in working order by July next. The gross receipts of the company for the six months ending 30th September, 1872 (less the loss on exchange and rent, and subsidies for land lines), amounted to £175,840, and the expenses, including income tax, to £42,939—leaving a balance of $132,901. The directors had already paid two interim dividends of 1½ per cent. each on account of profits, which absorbed £101,901, leaving £90,991 to be carried forward. The capital account showed a total expenditure of $3,442,461.

The Chairman, in moving the adoption of the report, said that they were making steady progress in the right direction. They thought they would be able to give a dividend of 8 per cent., but the net receipts were only equal to 7½ per cent. for the past half year. He had no doubt that it would be made up in the next six months. The gross receipts, for the six months prior to the amalgamation, amounted to £149,050, and, for the first six months after it, to £177,870—showing an increase of £28,870, or 19 per cent. They had reduced the tariff on messages to India to 10s. per word, but the traffic had not increased so much as they expected. Companies had been started with an ingenious system of packing, by which they managed to condense a number of messages into one. Telegraphy must go forward, and he had no doubt that the result of those operations would be to increase the business of the company. They had proposed to the Indian Government the "one word tariff," which worked so well on the Atlantic lines, but they did not see their way in the matter. The Egyptian tariff had been reduced from 30s. to 20s. for ten words, and if those reductions did not increase business in that proportion the dividend would not increase. The reductions in the tariff had not yet increased the traffic sufficiently to repay them. The cost of everything was more than formerly, and unless the traffic increased in proportion the dividend would not increase.

The Board of the Anglo-American Telegraph Company have resolved to recommend the declaration of a dividend of 4 per cent., and a bonus of 2 per cent., at the annual meeting of the 14th of Feb., making, with the three interim dividends of 2 per cent. each already paid, 12 per cent. per annum. This amount added to the Renewal Fund is £100,000, leaving a balance of £16,000 to be carried forward.

The directors of the French Atlantic Telegraph Company have declared an *interim* dividend of two per cent. for the quarter ended December 31.

A Conference has been held at Simla on the subject of amalgamating the Indian Telegraph and Postal Departments. We understand that Mr. Monteith has already submitted to Government a report, in which, while admitting the utility of the measure, so far as expenditure is concerned, he has observed that the success of the scheme in England furnishes no guarantee of its success in India, the circumstances of the countries being quite dissimilar.

The *Madrid Gazette* has published the royal decree granting to M. Lassarte the right to lay a submarine telegraph cable between Cadiz and Cuba. Another decree grants to the company which has the concession for laying a cable between Barcelona and Italy the right to erect a telegraph line between Madrid and Barcelona, to be exclusively reserved for the telegrams transmitted by that cable. The *Imparcial* announces that several English firms have made very advantageous proposals to the Spanish Government for the purchase of the Spanish telegraph lines, and for the working and maintenance of them.

There seems to be some contention as to the rights of establishing cable communication between the River Plate and Rio de Janeiro. Mr. Basil Holmes, Secretary to the Montevidean and Brazilian Telegraph Company, writes to say, with reference to a statement in the *London Times*, that a contract has been signed by Messrs. Siemens Brothers to lay a submarine cable between Rio Janeiro and Montevideo; his company now holds the exclusive concession for a telegraph cable from Montevideo to Brazil, and that the cable will be laid early this year. The final paragraph in the letter, however, seems to show that this concession is only from the Government of Uruguay, whereas a joint concession from Brazil and Uruguay will be necessary for the work, and such a concession is fully believed to be in possession of the Platino Brazilian Telegraph Company, with whom Messrs. Siemens are stated to have made a contract.

The cable across the Pentland Firth having been successfully laid, telegraphic communication is reopened between Great Britain and the Orkney and Shetland Islands.

The traffic receipts of the Great Northern Telegraph Company for the month of December amounted on the European lines, to 88,785f. (£3,551), and for December, 1871, to 79,483f. (£3,179), The receipts on the China and Japan lines amounted to 102,810f. (£4,112), and for the month of December, 1871, to 59,038f. (£2,361)—showing an increase of 43,772f. (£1,751).

The traffic receipts of the Eastern Telegraph Company for January amounted to £33,287, against £37,953 in the same month last year.

Another decree has been published by the Spanish Government, authorizing the Direct Spanish Telegraph Company to construct a line between the terminus of the cable at Irun and Madrid, to be reserved expressly for the use of the cable.

The total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ended the 11th January, was 275,341—an increase on the corresponding week of last year of 35,917.

The number of messages forwarded from postal telegraph stations in the United Kingdom during the week ended the 18th January, 1873, was 283,679—an increase over the corresponding week of the previous year of 45,456.

The total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ended January 25th, 1873, was 289,173—an increase over the corresponding week of last year of 52,432.

The total number of messages forwarded from postal telegraph stations in the United Kingdom, for the week ending February 1, 1873, was 290,161—an increase on the corresponding week of last year of 43,829.

THE PROPOSED AMALGAMATION OF THE ATLANTIC CABLE COMPANIES.

There seems to be a revival of the agitation of the early part of last year in favor of amalgamation of the Atlantic Companies, which then resulted in only a very partial success. We cannot regard otherwise than with blank amazement the conduct of the directors in resisting for a moment such a desirable consummation. Can it be that they fear a reduction of the Boards and loss of fees? In no other way is it comprehensible. If so, we would recommend the shareholders to provide a handsome retiring allowance for any director whose continued services may not be considered necessary. We wish to point out what is lost by delay in completing the amalgamation. The Eastern Telegraph Company quietly completed its amalgamation of the Falmouth, Marseilles, Anglo-Mediterranean and British Indian cables a year ago. The £10 shares of the amalgamated company have reached £11—making £220 for the £100 stock of the Anglo-Mediterranean. The greater part of the receipts of this company depend on the single cable of the British Indian. The net revenue, without providing for reserve, is only a trifle over 8 per cent., yet the £10 shares are eagerly bought for investment at £11, or thereabouts. The revenues of the Anglo-American and French companies depend upon three parallel cables, and they amount for the past year to 17 and 18 per cent. on the respective capitals. The Anglo-American has a reserve of about 12 per cent. in hand, which could be divided before amalgamation, and, after deducting this, the price of its stock is only £125. If the public held it in the same estimation as Eastern stock, it would be over £200. In the same way of estimation French Cable shares would be £40, whereas they are only £25 *ex reserve!* We believe we are correct in saying that an amalgamation, issuing an amount of stock to yield 8 per cent. or so, is practically resolved upon, being delayed only till the French Company's second cable is laid. But wherefore delay for such a ridiculous reason? The risk of laying is only a matter of insurance, and seeing that the revenues are practically secure with three cables, the Anglo-American Company would be foolish to refuse the advantage it will get in the terms of amalgamation if it shares the risk of laying. We are glad to learn that the Great Western Telegraph Company is arranged with, and is to carry its cable elsewhere. The prospects of any single cable, against the united force of the Anglo and French would be miserable indeed.—*The Railway News.*

The report of the British-Australian Telegraph Company furnishes a balance sheet only to the 30th June, 1872, but states that the next accounts to be presented will show the results of the working of the cable from October 21, the date of the opening of through communication to Australia, to the 31st of December; that the gross receipts for the period during which the whole line was in operation in the year 1872, appear, from telegrams received, to amount to £11,658; that the question of amalgamation of the Trans-India companies has occupied the consideration of the Board; and that the terms upon which the directors will recommend this measure to the shareholders will be notified as soon as they are decided upon.

The German government has caused a telegraph station to be erected on the peninsula of Hela, which will enable vessels, in case of accident, to obtain assistance from Dantzig with the least possible delay.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
March 1, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Evansville, Ala., re-opened.
Yountville, Cal., closed.
Chillicothe, Ill., closed.
Literberry, Ill., closed.
Business for Biddeford, Me., should be checked to Saco, Me., at Saco rate.
Clear Fork, Mo., closed.
Lawrence, N. J., ck. Princeton Junction, N. J.
Newtown, N. J., ck. Hightstown, N. J.
Buiness for Old Bridge, N. J., will hereafter be checked to South Amboy, N. J., instead of Bordentown, N. J.
Black Lick, O., closed.
Corvallis, Or., closed.
Montrose. Pa., is now a W. U. Office, square 75.
Sandy Creek, Pa , closed.
Bloody Run, Pa., changed to Everett, Bedford Co.

NEW OFFICES.

557 Beaver Creek, Col.
288 Foresters, Ind.
376 Delhi, Iowa.
* Centre Waterboro, Me. 25 2 14 Portland, Me.
* East Lebanon, Me. 25 2 14 Portland, Me.
* South Waterboro, Me. 25 2 14 Portland, Me.
269 Berlin, Ottawa Co., Mich.
240 Fowler, Mich.
200 Romeo, Mich.
351 Taylor's Miss.
474 Saltillo, Neb.
* East Rochester, N. H., 25 2 14 Portland, Me.
47 Plainsboro, N. J., ck. Princeton Junc.
202 Big Walnut, Ohio.
201 Nankin, Ohio.
202 Summit, Licking Co., Ohio.
Rock Point, Or.
112 Everett, Bedford Co., Pa.
510 Sherman, Texas.
New Aukum, W. T.

OFFICES HAVING "SPECIAL SHEET A," will hereafter check Towsontown, Md., 20 cents more than Special rate to Baltimore, Md.

ATLANTIC CABLE BUSINESS.

The cable between Hong Kong and Shanghai is again in working order, and messages may be sent direct to Hong Kong, Shanghai and Nagasaki by the Russian, Falmouth or Teheren routes, or via Turkey.

The following changes in cable rates will take effect on and after March 1st, 1873:

From	To Great Britain and Ireland	To France.	
	For each Word.	For 10 Words.	For each Word over Ten
Texas, Arkansas, Missouri (except St. Louis), Kansas, Nebraska, Iowa, Minnesota, Colorado, Dacotah, Wyoming, New Mexico, Utah, Idaho, Montana, Nevada, California, Arizona, Oregon and Washington Terr..	$1 25	$12 50	$1 25
British Columbia.....	1 35	13 50	1 35

WILLIAM ORTON, President.

EXECUTIVE ORDER No. 144.

On and after the first day of March so much of Executive Order No. 139 as relates to the booking, checking and reporting of Signal Service messages as D. H. is hereby revoked, and the provisions of Order No. 125 will hereafter apply to such business, except that bills will not be presented for payment by managers of offices.

The messages will be treated as if prepaid, credit will be taken for amount thereof by special entry in monthly report No. 4, and the originals, with statement of account, forwarded as vouchers.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Feb. 20th, 1873.

Towanda, Pa., in D. H. Bates' district, has been closed as a money order office.

G. H. MUMFORD, *Vice-Pres't.*

EXECUTIVE OFFICE,
NEW YORK, Feb. 24th, 1873.

From and after March 10th, *Sherman, Texas*, will be added to the list of money order offices in D. P. Shepherd's district.

G. H. MUMFORD, *Vice-Pres't.*

EXECUTIVE OFFICE,
NEW YORK, Feb. 28th, 1873.

On and after March 15th money order offices will be established at the following-named points in J. F. Wallick's district:

Anderson, Ind.	Greencastle, Ind.
Crawfordsville, Ind.	Kokomo, Ind.

G. H. MUMFORD, *Vice-Pres't.*

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKNOWLEDGMENT OF RECEIPTS FOR ASSESSMENTS 37 & 38 TO FEBRUARY 24th.

The acknowledgment of receipt of any assessment is to be understood as an acknowledgment for all previous assessments.

4	25	26	37	42	44	51	53	58	67	75
76	92	95	101	122	129	143	146	148	181	218
218	227	231	247	278	279	280	281	282	283	285
297	303	311	319	323	332	350	354	357	359	362
364	366	367	382	385	391	392	393	402	456	481
483	516	520	527	533	542	553	554	556	557	569
570	574	579	592	600	617	622	628	630	632	649
661	670	671	672	678	679	680	684	696	702	708
710	714	725	734	735	737	738	741	758	769	775
781	782	783	785	786	798	802	820	825	836	838
841	848	869	876	883	899	906	908	912	916	918
920	926	927	939	942	944	949	978	991	992	998
1001	1006	1014	1016	1026	1030	1031	1032	1033	1034	1038
1041	1044	1050	1056	1058	1061	1063	1066	1084	1093	1134
1141	1149	1155	1156	1157	1158	1159	1160	1162	1164	1165
1185	1190	1215	1196	1217	1223	1224	1232	1237	1238	1239
1241	1248	1256	1261	1262	1263	1267	1281	1283	1284	1285
1286	1292	1294	1297	1298	1307	1308	1309	1311	1312	1313	1314
1315	1317	1318	1319	1320	1321	1322	1325	1328	1333	1353
1354	1355	1356	1357	1372	1376	1385	1386	1387	1389	1390
1391	1393	1404	1405	1406	1413	1425	1430	1431	1432	1433
1437	1438	1464	1465	1466	1468	1469	1470	1471	1474	1475
1476	1477	1479	1485	1490	1494	1498	1500	1501	1514	1518
1520	1526	1532	1553	1554	1559	1562	1565	1572	1578	1580
1583	1585	1589	1593	1594	1598	1603	1611	1612	1614	1615
1616	1625	1633	1634	1643	1644	1648	1649	1650	1656	1658
1660	1661	1662	1663	1665	1673	1680	1700	1701	1702	1703
1704	1707	1717	1732	1737	1746	1747	1748	1749	1762	1794
1795	1796	1797								

J. D. Easterlin, Charleston, S. C., and W. W. Kelchner, Springfield, Ill., have been appointed agents of the Association.

THE TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ORGANIZED IN 1867.

The heirs of deceased members receive one dollar from each of the surviving members of the Ascociation.

All engaged in the Telegraphic service are eligible to membership, if in good health and of good character and habits. Initiation fee $1.50.

Blank forms of Application and Restoration may be had of the Secretary, or of any of the following Agents:—

Augusta, Ga.,.....J. M. Crowley.
Baltimore, Md.,.....Archd. Wilson.
Buffalo, N. Y.,.....J. W. Tillinghast.
Cincinnati, O.,.....F. A. Armstrong.
Chicago, Ill.,.....W. C. Long.
Cleveland, O.,.....H. L. Melton.
Clinton, Ia.,.....E. O. Wait.
Erie, Pa.,.....G. W. Baxter.
Erie R'y Telegraph,...W. J. Holmes.
Harrisburg, Pa.,.....H. A. Clute.
Indianapolis, Ind.,....D. C. Hinsdale.
Mobile, Ala.,.....Wm. Sandford.
Memphis, Tenn.,.....J. J. Fowler.
Milwaukee, Wis.,.....D. H. Henshaw.
New Orleans, La.,....Jas. T. Alleyn.
Nashville, Tenn.,.....E. C. Boyle.
Philadelphia,.....Jas. Merrihew.
Phillipsburg, N. J.,....John Fuller.
Pittsburg, Pa.,.....S. L. Gilson.
Richmond, Va.,.....R. M. J. Paynter.
Syracuse, N. Y.,.....D. L. Pike.
St. Louis, Mo.,.....J. P. Cassiay.
San Francisco,.....J. S. Urquhart.
Seattle, Wash. Ter.,...F. H. Lamb.
Springfield, Mass.,....W. J. Denver.
Toronto, Ont.,.....A. Hunter.*
Washington, D. C.,...M. Marean.
White River Junc., Vt.,G. W. Gates.

Additional Agents wtll be appointed as soon as practicable.

Applications for membership should be endorsed by the Agent through whom they are made.

Members in communicating with the Secretary will always state the Number of their Certificate.

A. S. BROWN, Treas.
D. R. DOWNER, Secy.

* A. Hunter is Agent for all of Canada.

OFFICERS OF THE WESTERN UNION TELEGRAPH COMPANY.

WILLIAM ORTON, *President.*

Alonzo B. Cornell,
N. Green,
Augustus Schell,
George H. Mumford,
Vice Presidents.

George H. Mumford, *Secretary.* — R. H. Rochester, *Treasurer.*
George B. Prescott, *Electrician.* — W. H. Abel, *Auditor.*

Anson Stager, *Gen'l Sup't Central Division, Chicago, Ill.*
Thomas T. Eckert, *Gen'l Sup't Eastern Division, New York.*
John Van Horne, *Gen'l Sup't Southern Division, Louisville, Ky.*
James Gamble, *Gen'l Sup't Pacific Division, San Francisco, Cal.*

DISTRICT SUPERINTENDENTS.

Eastern Division.

J. C. Hinchman.....New York.
Robert T. Clinch..... St. John, N. B.
James S. Bedlow.....Portland, Me.
George W. Gates.....White River Junction, Vt.
Charles F. Wood.....Boston, Mass.
A. B. Chandler..... New York.
S. B. Gifford.....Syracuse, N. Y.
D. H. Bates .....Philadelphia, Pa.
W. J. Holmes .....New York.
A. G. Davis.....Baltimore, Md.

Central Division.

J. J. S. Wilson.....Chicago, Ill.
R. C. Clowry..... St. Louis, Mo.
W. B. Hibbard.....Omaha, Neb.
C. O. Rowe.....Pittsburgh, Pa.
E. P. Wright..... Cleveland, O.
John F. Wallick.....Indianapolis, Ind.
Geo. T. Williams.....Cincinnati, O.

Southern Division.

1st District. J. R. Dowell, Sup't, Richmond, Va.; J. W. Kates, Ass't Sup't, Richmond, Va.
2d District. J. B. Tree, Sup't, Louisville, Ky.; Geo. W. Trabue, Ass't Sup't, Nashville, Tenn.
3d District—J. A. Brenner, Sup't, Augusta, Ga.
4th District—C. G. Meriwether, Sup't, Mobile, Ala.
5th District. D. Flanery, Sup't, New Orleans, La.; James Compton, Ass't Sup't, Jackson, Miss.
6th District. L. C. Baker, Sup't, Little Rock, Ark.; Wm. A. L'Hommedieu, Ass't Sup't, Monroe, La.
7th District—D. P. Shepherd, Sup't, Houston, Texas.

Pacific Division.

Geo. L. Ladd.....San Francisco, Cal.
Frank Bell.....Reno, Nevada.
O. P. S. Plummer.....Jacksonville, Oregon.
F. H. Lamb.....Olympia, Washington Ter.
R. R. Haines.....San Diego, Cal.

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(From the New York Ledger.)

JOSEPH PRIESTLEY.

BY JAMES PARTON.

Time brings its revenges. I read in a recent number of the London *Athenæum*, a quiet advertisement informing the public that "it is proposed to honor the memory of Dr. Priestley, and to commemorate his discoveries and his services to the scientific world by the erection of a statue in Birmingham, where he lived so many years."

The advertisement goes on to say that, as no other public memorial of Dr. Priestley exists, it is believed that a large number of persons interested in science will be glad to contribute something to perpetuate the memory "of the father of pneumatic chemistry, the discoverer of oxygen, and one of the most illustrious men of science whom the last century produced." Then follows a list of sixty-six subscriptions, varying in amount from fifty pounds to ten shillings. Among the names we recognize those of Professor Huxley, Mr. Martineau, Dr. Russell, Sir Rowland Hill, and several other members of the Royal Society.

A statute to Priestley in Birmingham! Does the reader happen to remember how Dr. Priestley left Birmingham seventy-nine years ago? July the 14th, 1791, some of the liberal people of that city proposed to celebrate by a public dinner the anniversary of the destruction of the Bastile, which had taken place only two years before. But two years in Revolutionary times is equal to a century. When the Bastile was destroyed in 1789, the event was hailed with joy throughout the world; but during the two days following, the revolutionists of Paris committed excesses which repelled and disheartened all but the staunchest friends of liberty---all but such as Priestley, who was recognized in Birmingham as a chief and representative of the liberal party. Priestley had published a reply to the "Reflections" of Edmund Burke. He had been named a citizen of the French Republic. He had defended the revolution in the local press.

The aristocratic fraction of Birmingham, whose instinct was then, and is now, to advance their cause by violence, determined to prevent the celebration. It is easy to stir up a riot in times of popular excitement, but it is not so easy to limit or check its ravages. After breaking up the banquet, and destroying the tavern in which it was given, the mob rushed to the house of Priestley, who had not attended the dinner, broke it open, and compelled the family to seek safety in flight. The rioters took out his books in armfulls—those precious books, the solace of his life, which he had been fifty years in gathering, for he was a hoarder of books from his infancy. His library was scattered over the road for half a mile, and his torn manuscripts covered the floors of his house. His apparatus was broken to pieces; and when the destruction of the interior was complete, the house was set on fire. The fire, however, was extinguished before further harm was done.

This disaster, strange to relate, made the philosopher's fortune; for although the jury, after a trial lasting nine years, awarded him but twenty-five hundred pounds damages, of his claim of more than four thousand, the liberal portion of the public subscribed handsomely to make good his loss. His own brother-in-law, as Lord Brougham tells us, gave him ten thousand pounds, besides settling upon him an annuity of two hundred pounds for life. As he already had a pension of one hundred and fifty pounds a year from Lord Shelburne, whose librarian he had formerly been, he was now in very liberal circumstances for a philosopher. In Pennsylvania, where he spent the residue of his life, such an income, at that period, was even superabundant.

There is an error in the advertisement quoted above. It is not true that no "public memorial" of Dr. Priestley has been erected. Every soda fountain is his monument; and we all know how numerous and how splendid they are. Every fountain, too, whence flow the home-made waters of Vichy and Kissingen, is a monument of Priestley, for it was he who discovered the essential portions of the process by which all such waters are made. The misfortune is, however, that, of the millions of human beings who quaff the cool and sparkling soda, not one in a thousand would know what name to pronounce, if he was called upon to drink to the memory of the inventor. And really his invention of soda water is a reason why Americans should join in the scheme to honor his memory. He not only did all he could to assist the birth of the nation, but he invented the national beverage.

Yet he always protested that he was very little of a chemist; and often said that his making chemical experiments at all was a kind of accident. A Yorkshire man by birth, the son of a cloth finisher, he was one of those boys who take to learning as a duck takes to the water. He was an eager, precipitant student from his childhood up. Not content with the Latin and Greek of his school, he must needs learn Hebrew in the vacations, and push on into other ancient languages of the East, Chaldaic, Syrian, Arabic, not neglecting such trifles as French, Italian, and German. This way of passing youth never fails to do lasting injury. He had an aversion to the sports of the playground, and to all the lighter literature. Need I say, then, that before he was eighteen years of age his health had completely broken down, and he was obliged to lay aside his books for months?

Beginning life as a Calvinist minister, he gradually adopted a milder theology—became, in fact, a Unitarian, and abandoned the pulpit for a time. Then he set up a school. He spent many years in teaching and writing school books, his first publication being an English grammar for children. At one school, where he taught for a while, a course of lectures was given on chemistry, a science of which he knew nothing, not even its object or nature. Attending these lectures, his curiosity was awakened and he began to experiment.

It was Dr. Franklin's influence, however, that weaned him from other subjects, and caused him to devote his main strength to science. In 1761, when Dr. Franklin was in London, Priestley who was in the habit of visiting the city once a year, sought the acquaintance of Franklin, and became intimate with him. Franklin related to him the history of those delightful six winters, during which he and his Philadelphia friends were experimenting in electricity. The young schoolmaster, who had already had some success in bookmaking, now offered to write a history of electricity, if Franklin would put him in the way of getting the material. Twelve months after Franklin had the pleasure of receiving from his industrious friend a copy of the work, one of those square massive quartos in which the science of that age was usually given to the world. In this work was printed, for the first time, a narrative of Franklin's immortal experiment with a kite, which Priestley received from the experimentor's own lips. It is a curious fact in the history of science, that Dr. Franklin himself never took the trouble to write out an account of this experiment—the most daring, ingenious and celebrated which science records. The work was remarkably successful, passing through three editions in nine years. From this time onward, Priestley was almost wholly a man of science, and no year passed without his adding something to human knowledge. He very greatly increased our knowledge of the air we breathe and its constituent gases.

He would have been even more successful, if he had been more favored by fortune. Being compelled, through his poverty, to spend a large portion of his time and strength in earning his livelihood, he could not follow out his discoveries, nor pursue them with that watchful calm so necessary for avoiding error, and perfecting truth. His zeal, however, made up in some degree for his lack of means, and the list of his discoveries will always invest his name with distinction.

Later in life, he accepted an offer to enter the service of the Earl of Shelburne, as librarian. He had better retained his poverty and independence. He groaned under servitude, and would have thrown up his employment sooner than he did, but for the advice of Dr. Franklin. Franklin told him to arrange all the reasons for keeping his situation in one column, and all the reasons for leaving it in another, then strike a balance, and so reach a wise conclusion. Priestley supported his servitude a while longer, but he was glad enough to retire, in 1778, upon a pension of one hundred and fifty pounds a year.

During the whole period of Franklin's residence in England, Priestley aided him by his pen and influence by opening the eyes of the public to the folly of the Ministry in estranging the American colonies. The last day of Franklin's stay in London, Priestley spent with him from morning to night, without interruption, looking over American newspapers just arrived. Franklin was completely overcome with the prospect of a civil war, and the dismemberment of the Empire.

"A great part of the day," says Dr. Priestley, "he was looking over some American newspapers, directing me what to extract from them for the English ones; and in reading them, he was frequently not able to proceed for the tears literally running down his cheeks."

The two friends never met again; for it was not until 1794, when Franklin had been dead four years, that the English philosopher landed in New York. He had a distinguished public reception in the city, and proceeding to Philadelphia, he was invited to become Professor of Chemistry in the University of Pennsylvania. He declined on the ground that he did not know enough of the subject. He refused also an offer, most munificent for that day, of a thousand dollars, for a course of scientific lectures in Philadelphia. His labors in America were chiefly theological, and he resided usually on his son's farm in Northumberland county, Pennsylvania. He died in 1804, aged seventy one. He was an immense personage in his day. The public were constantly reminded of his existence by some publication bearing his name. According to Allibone, he gave the public one hundred and forty one separate works.

A NEW WAY TO KINDLE A FIRE.

On the 26th of December a fire occurred in Goodyear's India Rubber Works, Naugatuck, Conn., which originated in an unheard of manner. In the proofs of loss the claimants make the following remarkable statement: The superintendent, who was in the room where the fire originated, and at the time, states that while one of the workmen was handing rubber goods the air seemed to be charged with electricity, it being in the midst of a violent snow storm, the mercury meanwhile being at or near zero; then there seemed to come from his hand a flame, which instantly communicated with the goods and dry pine of the building, the fire not being under their control for a moment. Others in the neighborhood received severe shocks of electricity on that day in their houses.—*Washington Star.*

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, MARCH 1, 1873.

DEPARTURE OF THE WESTERN UNION COMMISSION FOR EUROPE.

Mr. George B. Prescott, Electrician of the Western Union Telegraph Company, and Gen. Thomas T. Eckert, General Superintendent of the Eastern Division, sailed for Europe, on the steamship *Java*, of the Cunard line, on Wednesday, the 19th ult., upon their mission to examine the latest improvements in the telegraphic service there. It is not believed that the service in Great Britain, or, indeed, in any part of Europe, is, in any degree, superior to our own, but it is probable that there are a number of labor-saving devices in operation there which might be advantageously employed in this country. Should such prove to be the case, these devices will at once be introduced upon the lines of the Western Union Company.

The Commission will give especial attention to the employment of pneumatic tubes, which are being used in the principal places in Europe, in connection with the telegraphs, for the transmission of messages between the offices in the large cities, and also thoroughly examine the system of subterranean lines.

It is to be expected that much benefit will accrue to the service from the mission of Messrs. Prescott and Eckert. The practical knowledge of the telegraphic business possessed by these gentlemen will enable them to investigate into and decide upon the adaptability to our necessities of any improvements which may be found to exist.

MANAGERS of offices who may have accounts in error with Augusta, Maine, office, prior to November 1st, 1872, are notified that all communications upon such business should be addressed to J. S. Bedlow, Superintendent, Portland, Maine.

The usual course will be pursued with errors which have occurred subsequent to that date.

Executive Order No. 144, concerning the treatment of signal service business, appears on page 102.

THE supplementary tariff sheet which accompanies this issue of the JOURNAL, contains all changes of every nature which have been made since the issue of the present book of rates. Managers will carefully note all instructions therein contained.

THE DUPLEX TELEGRAPH.

One of the most important inventions for facilitating and cheapening the transmission of messages, which has been made since the first telegraphic apparatus was put into successful operation by Morse, has been acquired by the Western Union Telegraph Company during the past year. It is styled the "Duplex Telegraph," and is the invention of Mr. J. B. Stearns of Boston. By means of this apparatus, messages can be transmitted in opposite directions upon a single wire, at the same time. The first trial of this apparatus upon the Company's lines was made between New York and Albany in August, 1871. A second set was put on between New York and Boston on the 9th of October following. During the great pressure of business occasioned by the Chicago fire, these instruments rendered most important service under circumstances when it was impossible to provide for the sudden and unexpected demand for increased facilities by the erection of additional wires. They have since been introduced, and are now working successfully, upon circuits between New York and Buffalo, New York and Chicago, New York and Albany, New York and Cincinnati, New York and Syracuse, New York and Pittsburgh, New York and Baltimore, New York and Washington, New York and Philadelphia, New York and Long Branch, New York and Saratoga, New York and Boston (two circuits), New York and Plaister Cove, New York and Chattanooga, Boston and Portland, Sacramento and San Francisco, Buffalo and Chicago, Cincinnati and Chicago, Cincinnati and St. Louis, Cincinnati and Washington, Cleveland and Indianapolis, Pittsburgh and Chicago, St. Louis and Chicago, Philadelphia and Pittsburgh, and Philadelphia and Harrisburgh. But for the impossibility of getting the instruments manufactured, they would have been introduced upon many other circuits.

When it is considered that by this apparatus, in addition to doubling the capacity of the wire, there is saved the interest on the investment for the cost of an additional wire; the cost of maintenance, and the liability of wires to interfere with each other when a large number are crowded upon one line of poles, some idea can be formed of the value of this wonderful discovery.

The chief use of the "Duplex Telegraph" is upon circuits between cities which exchange more messages with each other than can be transmitted over a single wire. The number of such circuits is now somewhat limited, but they are rapidly increasing.

The number of messages transmitted by the lines of the Western Union Telegraph Company has doubled within six years, and it is believed that the increase during the same period in the future will be larger. The greatest increase of traffic will doubtless continue to be between the large cities and on routes some of which are already overcrowded with wires.

A peculiarity of the Duplex is that it can be substituted for the apparatus now in use, and worked in the ordinary way, at a comparatively small additional expense. It is thus always ready for an emergency; and by an exchange of signals calling for an additional operator at each end, and an adjustment which can be made in a minute, one wire is practically converted into two, not by doubling its capacity to send messages one way, but by enabling it to transmit at the ordinary speed both ways. The same operating table may be occupied for the transmission of messages upon two wires by the Morse system, or upon one by the Duplex. It has performed excellent service during the past Summer, between New York and Saratoga, and New York and Long Branch. Between these places there is a very heavy business during three months of the year, a moderate business during another three months, while for the remaining six months there is scarcely occupation for one wire. To provide the wires required for the maximum business during the shorter period, involves a large investment which yields no return for about three-fourths of the time. The adaptation of the Duplex to this part of the business is complete.

It is but justice to one of the ablest Electricians in this, or any other country, and one of the most faithful and capable of the Western Union Company's employés, that we should say here, that great as is the credit justly due the inventor of this apparatus, its present perfect adaptation to the use for which it is designed is largely due to the scientific and practical knowledge, the cheerful and earnest labors of Mr. George B. Prescott, the Company's Electrician.

The State Senate of Pennsylvania has passed a resolution of instructions to the Senators representing their State in Congress to vote against the Postal Telegraph Bill.

SINCE Mr. Creswell got the postal telegraphic bee in his bonnet, he has been as uneasy as the old woman of Mother Goose, who "would never be quiet." His latest move is to get Senator Stewart to bring in a resolution directing the postal committee to find out what it really costs to build and run telegraphs, and whether the existing companies have any rights that a progressive Postmaster-General is bound to respect.

A SHORT telegraph line, owned and operated by the Adirondack Railroad Company, extends north from Saratoga, N. Y., about 60 miles. Mr. Charles H. Ballard, of Saratoga Springs, N. Y., is superintendent. The stations on the line are South Corinth, Jessup's Landing, Hadley, Stony Creek, Thurman, River Side, The Glens, Schroon Lake, Pottersville and Chesterton.

IT is understood that on the closing up of the accounts of the New York, Newfoundland and London Telegraph Company, consequent on its recent transfer to an English company—the first step toward its complete amalgamation—a dividend at the rate of 12 per cent. for the remainder of the year 1872 has been declared.

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Journal of the Telegraph---Supplement.

SUPPLEMENT No. 2 OF THE TARIFF BOOK.

This Supplement contains a full list of the names of new offices, ("additions") offices closed, and the general information given in the Supplement dated September 16, 1872, and the TARIFF BUREAU CIRCULARS issued since that date.

Offices whose Tariff Books have been corrected by the circulars, will have no other use for the Supplement than as a list for reference. Other offices whose books have not been corrected, and those offices opened since October 1, 1872, should carefully correct their books by this Supplement, and then keep it in their Tariff Book for convenient reference.

General Notice.—All Western Union rates which previous to February 1, 1873, were higher than $2.50 for ten words, have been reduced to that amount.

Offices in the Eastern, Central and Southern Divisions, whose rate to points West of Utah is $2.50, will charge at rate of $2.75 and 18 on messages RECEIVED COLLECT FROM such points, but on all other business the rate must not exceed $2.50 for ten words.

The asterisk (*) is used to denote other line offices.

INSTRUCTIONS.

PAGE VI.—Half-rate messages may be taken for, and received from offices in squares 509, 510, 511, and 587.

ALABAMA.

NOTE.—No business for other Line Offices in Alabama, Georgia, or Mississippi, will hereafter be sent via Chattanooga, Tenn.

CHANGES:

Atalla, 80 5 342 Meridian, Miss.
Auburn, closed.
Birmingham, is now W. U. Office, Square 294.
Blakeley, closed.
Carthage, 50 3 342 Meridian, Miss.
Chehaw, closed.
Collinsville, 90 6 342 Meridian, Miss.
Evans' Mill, closed.
Eutaw, 50 3 342 Meridian, Miss.
Green Pond, 60 4 342 Meridian, Miss.
Jacksonville, closed.
Livingston, 30 2 342 Meridian, Miss.
Notasulga, closed.
Springville. 75 5 342 Meridian, Miss.
Tensas, closed.

ADDITIONS:

304 Bellevue.
285 Blount Springs.
324 Carpenter's Sta.
305 Canoe Sta.
267 Cowles Sta.
286 Cooper.
285 Cunningham.
286 Elmore Sta.
295 Fort Deposit.
285 Gilmans.
293 Hartsells.
294 Lomax.
293 Madison.
285 Milner.
294 Pelham.
275 Scottsboro.
267 Salem.
285 Warrior.
285 Wilhites.
*Shelby Iron Works, 50 5 294 Columbiana, Ala.
*Valley Head, 90 6 342 Meridian, Miss.

ARKANSAS.

CHANGES:

Huntersville, closed.

ADDITIONS:

412 Argenta.
381 Madison.

BRITISH COLUMBIA.

ADDITIONS:

*Cache Creek, 150 60† Laconner, W. T.
*127 Mile House, 150 60† Laconner, W. T.
*Ft. Garry, in British North America. 225 15 307 Chicago, Ill.

† Each additional five words or less.

CALIFORNIA.

CHANGES:

Alameda, closed.
Alta, closed.
Bayley's Ranch, closed.
Blue Canon, closed.
Brooklyn, closed.
Cisco, closed.
Coloma, closed.
Firebaugh's Ferry, closed.
Hayward's, closed.
Markleeville, closed.
Menlo Park, closed.
Michigan Bluffs, closed.
Modesto, is now a W. U. office.
Monitor, closed.
Mountain View, closed.
New Castle, closed.
Rocklin, closed.
Roseville, closed.
Summit, closed.
Wheatland, closed.
Woodford, closed.
Yosemite Valley, closed.

ADDITIONS:

Bridgeport.
Cloverdale.
Concord.
Gallatin.
Merced.
Mission of San Jose.
Redding.
Soquel.
Turlocks.
Yountville.
*Big Oak Flat, 75 35 Sonora, Cal., ck. San Fr.
*Altamont, 50 25 San Francisco.
*Belmont, 30 15 San Francisco.
*Chinese Camp, 60 30 Sonora, ck. San Fran.
*Cherokee Flat, 25 10 Oroville, ck. San Fran.
*Fresno, 90 30 San Francisco.
*Goshen, 125 60 San Francisco.
*Jamestown, 60 30 Sonora, ck. San Fran.
*Melrose, 30 15 San Francisco.
*Milbrae, 30 15 San Francisco.
*Sargents, 60 30 San Francisco.
*Tipton, 125 60 San Francisco.
*Tulare, 125 60 San Francisco.
*Wilmington, 60 30 Los Angeles, ck. San F.

COLORADO.

ADDITIONS:

557 Black Hawk.

CONNECTICUT.

CHANGES:

Bethel, is now a W. U. Office, square 37

ADDITIONS:

40 East Canaan.
29 East Lyme, P. O. A., Niantic, Conn.
25 Oneco.
32 Norfolk.
37 Thomaston.
*Chester, 30 3 32 Hartford, Conn.
*Centre Brook, 30 3 32 Hartford, Conn.
*Cromwell, 30 3 32 Hartford, Conn.
*Edgecomb House, Groton, 25 2 29 New London.
*Higganum, 30 3 32 Hartford, Conn.

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*New Saybrook,	30	3	32 Hartford, Conn.
*Rocky Hill,	30	3	32 Hartford, Conn.
*Wethersfield,	30	3	32 Hartford, Conn.

DACOTAH.

CHANGES:

Elk Point,	45	5	463 Sioux City, Iowa.
Fargo,	225	15	307 Chicago.
Fort Randall,	200	15	463 Sioux City, Iowa.
Grand Forks,	200	13	307 Chicago.
Pembina,	225	15	307 Chicago.
Shyenne Crossing,	200	13	307 Chicago.
Vermilion,	65	8	463 Sioux City, Iowa.
Yankton,	110	10	463 Sioux City, Iowa.

ADDITIONS:

*Fort Scully,	300	20	463 Sioux City, Iowa.

DELAWARE.

CHANGES:

Kirkwood, closed.

ADDITIONS:

67 Newport. 67 Hockessin.

FLORIDA.

CHANGES:

Fernandina,	125	11	198 Lake City, Fla.

ADDITIONS:

*Milton,	100	10	305 Pollard, Ala.
*Molino,	100	10	305 Pollard, Ala.
*Palatka,	100	6	198 Lake City, Fla.

GEORGIA.

CHANGES:

Calhoun, closed.

Morgansville.	100	7	342 Meridian, Miss.

Ringgold, closed.

Trenton.	100	7	342 Meridian, Miss.

ADDITIONS:

196 Barnett.
226 Conyers.
237 Jonesboro.
196 Thomson.
256 Plainville.
266 Pryor's Station.
206 Washington.

ILLINOIS.

CHANGES:

Beckwith, closed.
Cairo is in square 329.
Caledonia is in Boone Co.
E. St. Louis, check St. Louis.
Fox, closed.
Harlem, Cook Co., changed to Oak Park.
Iuka, P. O. address, Middletown.
Jonesboro, changed to Anna.
Lombard, should read Lombardville.
Manica, should read Monica.
Mound City is in square 329, and in Pulaski Co.
Nameoki, closed.
Norris is in Fulton Co.
Oakland, changed to Ray.
Opdyke, closed.
Rock Island Junction, Cook Co., P. O. address Englewood.
Tampica should read Tampico.
Woodlawn, closed.

ADDITIONS:

328 Altamont.
329 Anna.
298 Bloom.
309 Bridgeport.
326 Brooklyn
358 Literberry.
308 Melvin.
298 Momence.
300 Mt. Carmel.
308 Milford.
328 Beecher City, Effingham Co.
298 Beecher, Will Co.
327 Belle Flower.
337 Barclay.
327 Clinton.
336 Cazenovia.
337 Cornland.
378 Carr.
326 Compton.
298 Crete.
319 Dahlgren.
327 De Witt.
329 De Soto.
337 Edinburgh.
307 East Batavia.
327 Ellsworth.
329 Eldorado.
348 Edwardsville Crossing.
298 Frankfort.
319 Fairfield.
346 Fenton.
308 Gibson.
298 Grant, Kankakee Co.
319 Grayville.
307 Grand Crossing.
346 Garden Plain.
308 Hoopston.
329 Harrisburg.
378 Hull's.
298 Iroquois.
348 Irving.
336 Lafayette.
308 Lovejoy, Iroquois Co.
308 Loda.
318 Lovington.
347 Mapleton.
368 Mounds, Brown Co.
327 Mahomet.
319 NorrisCity, WhiteCo.
357 North Henderson.
378 New Canton.
318 Oakland, Coles Co.
357 Osco.
307 Oak Park.
328 Oconee.
298 Papineau.
358 Pleasant Plains.
326 Paw Paw.
337 Rochester.
310 Ridgeway.
308 Rankin.
378 Rockport.
346 Rock Falls.
308 Roberts.
368 Ray
308 Rossville.
298 St. Ann.
308 St. Joseph.
298 St. Mary.
357 Spring Grove.
337 Sherman.
327 Saybrook.
378 Seehorn.
326 Shabbona.
338 Tilden.
336 Toulon.
318 Tuscola.
329 Tunnel.
329 Vienna.
298 Waldron.
327 White Heath.

INDIANA.

CHANGES:

Allen's, closed.
Bridgeport, should be checked direct.
288 Clarke is in Lake Co.
Knightsville, should be checked direct.
Lyons, closed.
Palestine, P. O. address is Sugar Grove, Hancock Co.
Patriot, closed.
Rising Sun, closed.
Sunnyside, closed.
180 Valparaiso should read, 280 Valparaiso.
Williamsport, closed.

ADDITIONS:

281 Amo.
281 Avon.
271 Arcadia.
289 Atkinson.
241 Auburn Junction
288 Burdick.
253 Batesville.
289 Boswell.
261 Cherubusco.
261 Corunna.
299 Clinton.
289 Colfax.
271 Clymers.
253 Cold Spring.
290 Clark's, Daviess Co.
261 Denver.
299 Ellsworth.
289 Earl Park.
299 Evansville, Terre Haute and Chicago Junc.
271 Frankfort.
280 Koutts.
262 Milton.
299 Montezuma.
281 Malott Park, P. O. address is James' Switch, Marion co.
289 Montmorency.
299 Newport, Vermillion Co.
261 North Manchester.
299 Perrysville.
288 Ross.
261 South Whitley.
298 Shererville.
299 Seeleyville.
300 St. Francisville.
289 Templeton.
288 Whitings.
281 Whitestown.
270 Warrens.

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289 Fowler. 299 Waveland.

*Decatur, { 60 4 242 Richmond, Ind. / 25 2 261 Ft. Wayne, Ind.

*Portland, { 40 3 242 Richmond, Ind. / 40 3 261 Ft. Wayne, Ind.

INDIAN TERRITORY.

CHANGES:

Big Cabin Creek, closed.

ADDITIONS:

509 Atoka.
509 Caddo.
477 Chateau.
468 Fort Gibson
468 Gibson's Station.
478 McAllister.
468 North Forktown.
509 Red River.

IOWA.

CHANGES:

Alpine, changed to Cliffland.
Crawford, changed to Dowville.
Plymouth is now a W. U. Office, square 406.
377 Rome is in Henry Co.

ADDITIONS:

436 Ashewa.
436 Bedford.
356 Bellevue.
367 Centre Junction.
397 Comstock.
407 Colo.
377 Cone.
436 Conway.
455 Clarinda.
397 Cliffland.
426 Carlisle.
454 Dowville.
417 Derby.
356 Epworth.
387 Ely.
455 Essex.
376 Elkport.
367 Eldridge.
417 Garden Grove.
366 Harpers' Ferry.
367 Hale.
376 Hopkinton.
417 Humeston.
426 Indianola.
397 Keota.
366 Lansing.
417 Leon.
367 Lost Nation.
367 Martelle.
397 Mt. Sterling.
366 No. McGregor.
366 New Albin.
367 Olin.
377 Port Allen.
367 Paralta.
397 Shocks.
376 Strawberry Point.
397 Sigourney.
367 Tipton.
454 Tip Top.
367 Virogwa.
388 Viele.
367 Wyoming.
426 Wintersett.

KANSAS.

CHANGES:

Chapman's Creek, changed to Chapman's.
Divide, changed to Colony.
Fossil Creek, changed to Russell.
Kingsville, closed.
Rossville, closed.
Wilson's Creek, changed to Bosland.

The towns of New Chicago and Tioga have been consolidated under the name of Chanute, Ks. All business for these points should be checked to Chanute.

ADDITIONS:

502 Blue Rapids.
523 Bosland.
457 Colony.
456 Cummins.
476 Chanute.
530 Dodge City.
456 Doniphan.
456 Grasshopper Falls.
457 Godfrey.
525 Great Bend.
465 Highland.
518 Hutchinson.
447 Hillsdale.
525 Larned.
475 Meridian.
465 No. Robinson.
467 Oswego.
521 Raymond.
523 Russell.
503 Safford.
518 Sedgwick City.
465 White Cloud
518 Wichita.

KENTUCKY.

ADDITIONS:

223 Carlisle.
264 Horse Cave.
339 Jordon.
223 Marshalls.
233 Newport.
310 Nortonsville.
243 Shawhan.

LOUISIANA.

ADDITIONS:

375 Hammonds.
375 Kenners.
*Bayhi Plantation. 100 5 375 New Orleans, La.
384 Tangipahoa.
384 Tickfaw.

MAINE.

CHANGES:

Booth Bay is now W. U. office, square 14.
Bucksport should read 30 3 10 Bangor, Me.
Burnham, check direct.
Castine should read 30 3 10 Bangor, Me.
Clinton, check direct.
Lisbon, closed.
Searsport is now a W. U. office, square 11.
Stockton is now a W. U. office, square 11.

ADDITIONS:

14 Auburn, ck. Lewiston,
17 Biddeford.
6 Danforth.
13 Etna, ck. Newport.
20 Fryeburg.
9 Harrington.
17 Kittery.
*Mill Bridge 25 2 9 Cherryfield, Me.
10 Kingsman, check Bangor.
10 Orono, ck. Bangor.
20 Sebago Lake.
20 West Baldwin.
10 Winn, ck. Bangor.
17 York.

MARYLAND.

CHANGES:

Chestertown, now other line office, 40 3 67 Townsend, Del.
Cambridge is now W. U. office, check direct.
Darlington, closed.
Easton is now W. U. office, check direct.
Eckhart, 20 1 122 Cumberland, Md.
Frostburg, 20 1 122 Cumberland, Md.
Kingston, closed.
Lonaconing, 20 1 122 Cumberland, Md.
Mt. Savage, 20 1 122 Cumberland, Md.
Ocean Mines, 20 1 122 Cumberland, Md.
Westover, closed.

ADDITIONS:

60 East New Market.
60 Greensboro.
67 Hopewall Cross Roads.
60 Linkwood.
67 Marydell.
*Kennedyville, 30 2 67 Townsend, Del.
*Massey'sCross R'ds, 25 2 67 Townsend, Del.
85 Towsontown.
122 Mt. Savage Junc.
85 Phenix Sta.
60 Ridgely.

MASSACHUSETTS.

CHANGES:

Framingham, check direct, square rate.
Georgetown, closed.
Harrison Square, check direct, square rate; erase delivery charges.
Mitteneaque, erase P. O. address.
Monument, closed.
South Dedham, P. O. A. is Norwood.
West Newton, closed.
W. Springfield, check Mitteneaque.

ADDITIONS.

21 Arlington.
21 Braintree.
25 Brookfield
21 Milton.
21 Norwood, check South Dedham.

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21 Bay View.
18 Cohasset Narrows.
21 Danvers.
28 Deerfield.
25 East Brookfield.
25 East Douglass.
21 Essex.
21 East Saugus.
21 Forest Hill Station.
21 Lexington.
18 Mattapoisett.
*Cherry Valley. 15 1
*Norton. 25 2
28 No. Leominster.
18 No. Abington.
21 Peabody.
18 Plympton.
40 Richmond.
21 Somerville.
18 South Weymouth.
28 Shirley.
18 South Hanson.
25 Southbridge.
18 Stoughton.
25 Worcester.
18 Taunton.

MEXICO.

CHANGES:

600 Brownsville, Tex., in "Remarks" column, should read 589 Brownsville, Tex.

Lines in Mexico are now open for business to Offices whose "Tariff for other Lines" from Brownsville, Tex. is four dollars or less.

MICHIGAN.

CHANGES:

Greenwood should read 195 13 307 Chicago, Ill.
Howard is in Montcalm Co.
Huron, Monroe Co., changed to Rockwood.
Terry's Sta., closed.

ADDITIONS:

148 Arenac.
269 Barnett's, P. O. A., Shelby, Oceana Co.
231 Blissfield Junction.
179 Caseville.
127 Cheyboygan.
128 Crawford's Quarry.
220 Clyde.
127 Duncan City.
240 Dimondale.
270 Edwardsburg.
210 Elba.
179 Grindstone City
147 Greenbush.
270 Howard Station, Cass Co.
*Fayette, Hillsdale Co. 25 2
*Morenci. 25 2
260 Middleville.
270 Marcellus.
231 North Adams.
210 Otisville.
148 Oscoda.
210 Otter Lake.
230 Portsmouth.
148 Pinconning.
211 Rockwood.
240 Rives' Junction.
270 Robinson.
148 Standish, P. O. A. is Granton, Bay Co.
260 Saugatuck.
240 Springport.
211 Waltz.
231 Blissfield Junction.
231 Blissfield Junction.

MINNESOTA.

CHANGES:

Dallas, closed.
Etter, closed.
Oak Lake, changed to Audubon.

ADDITIONS:

190 Brownsville.
*Aldrich. 150 10 307 Chicago, Ill.
*Anthon. 150 10 307 " "
*Audubon. 200 13 307 " "
*Chaska. 100 7 307 " "
*Campbell. 150 10 307 " "
*Carver. 100 7 307 " "
*Claremont. 100 7 307 " "
*Clear Lake. 125 8 307 " "
*Crow Wing. 150 10 307 " "
*Detroit Lake. 150 10 307 " "
*Georgetown. 200 13 307 " "
*Glyndon. 200 13 307 " "
*Hawley. 200 13 307 " "
*Island Lake. 150 10 307 " "
*Kimberly. 150 10 307 " "
*Lakeside. 200 13 307 " "
*Motley. 150 10 307 Chicago, Ill.
*Moorhead. 200 13 307 " "
*Mountain Lake. 150 10 307 " "
*Perham. 150 10 307 " "
*Sauk Centre. 150 10 307 " "
*Sioux City Junc. 100 7 307 " "
*Thomson. 150 10 307 " "
*Weaver. 100 7 307 " "
*Wadena. 150 10 307 " "
*Withington. 150 10 307 " "
*Worthington. 150 10 307 " "

MISSISSIPPI.

CHANGES:

(*See "note" under Ala.*)

Quitman, closed.
Skugulak should read Shugulak.
Toombsuba, closed.

ADDITIONS:

363 Byram.
374 Boque Chitto.
331 Booneville.
362 Garner.
342 Lake.
384 McComb City
352 Pickens.
322 Prairie.
362 Torrance.
363 Terry.

MISSOURI.

CHANGES:

Carondelet, ck. St. Louis.
Edgarton, closed.
Gower, closed.
Pilot Knob, closed.
Rankin, closed.
So. St. Louis, ck. St. Louis
Triplett, closed.

ADDITIONS:

389 Auxvasse,
428 Aullville,
437 Atchison Junc.,
388 Alexandria,
428 Brownsville,
456 Blocks,
447 Belton,
446 Bolckow,
399 Beaver,
448 Carthage,
389 Chamois,
428 Concordia,
389 Cedar City,
418 De Witt.
456 De Kalb,
389 Fulton.
408 Griffin Crossing.
428 Houstonia.
359 Hematite.
437 Higginsville.
370 Ironton.
427 Jamesport.
455 Pickering.
409 Palestine.
456 Platte City.
379 St. Clair.
427 Spickards.

MONTANA.

CHANGES:

Junction Ranche, closed.

ADDITIONS:

581 Summit.
*Gallatin. 100 7 584 Helena, Mon.

NEBRASKA.

CHANGES:

Lincoln is now a W. U. office, square 474.
Waverly is another line office. The square number should be erased.

ADDITIONS:

513 Alexandria.
513 Fairbury.
465 Falls City.
474 Firth.
465 Humboldt.
*Beatrice, 105 7 474
*De Witt, 95 7 474
*Harvard, 140 9 474
*Juniata, 155 10 474
*Lowell, 165 11 474
522 Kearney Junction.
474 Sterling.
465 Salem.
502 Table Rock.
474 Tecumseh.
Plattsmouth, Neb.
" "
" "
" "
"

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NEVADA.

CHANGES:

Aurora, closed.
Carlin, closed.
Pioche City is now a W. U. Office. Erase "other line tariff."
Verdi, closed.
Wellington's, closed.
Wells is now a W. U. office. Erase "other line tariff."

ADDITIONS:

Franklin.
Franktown.
Schellburne.
Stough and Lewis.
Woodland.

*Bullionville,	150	15	576	Salt Lake City.	
*Glenbrook,	40	15†		Carson, Nev.	
*Raspberry,	85	30†		Elko,	"
*Tecoma,	60	30†		Elko,	"

NEW BRUNSWICK.

CHANGES:

Bay-de-Verte, closed.
Point-du-Chene, closed.

ADDITIONS:

3 Aulac.

*Clifton,	30	2	3	Sackville,	Mont Co.
*Caraquette,	30	2	3	"	"
*Pokemouche,	30	2	3	"	"
*Shippegan,	30	2	3	"	"
*Tracadie,	30	2	3	"	"

NEW HAMPSHIRE.

CHANGES:

Colebrook should read 50 3 14 Portland, Me.
Jackson, closed.
Plaistow, closed.
Rochester should read 25 2 17 Great Falls, N. H. / 25 2 14 Portland, Me.
So. New Market, check direct.

ADDITIONS:

24 Henniker,			20	No. Conway.	
*East Wakefield,	25	2	17	Great Falls,	N. H.
*Ossipee,	25	2	17	"	"
*Wakefield,	25	2	17	"	"
*W. Ossipee,	25	2	17	"	"
*Wolfboro',	25	2	17	"	"
*Wolfboro' Junc.,	25	2	17	"	"

NEW JERSEY.

CHANGES:

Barnegat, W. U. office, ck. direct.
Chatham, closed
Deal, closed.
Glen Gardner, ck. direct.
Hawthorne, closed.
Neshanic, ck. direct.
Norwood, closed.
Raritan, W. U. office, check direct.
Seaville, check direct.
Three Bridges, check Flemington.
Tuckerton, W. U. office, check direct; should be in square 42.
Weehawken, P. O. address Weehawken, Hoboken P. O., N. J.
West End, check Jersey City.
Whitings, check direct.

ADDITIONS:

52 Broadway.
47 Coalport, ck. Trenton, N. J.
52 Port Oram.
41 Roseville.
41 West Bergen.
47 Englishtown, check Jamesburg, N. J.
42 West Creek, Ocean Co.
41 Menlo Park.

NEW MEXICO.

CHANGES:

Red River, closed.

NEW YORK.

Note.—Unless otherwise stated, offices in squares 1 to 40 inclusive, 45 and 46 will add 15 cents to tariff to square 41, for rate to points on Long Island.

CHANGES:

Alden Station, changed to Crittenden, square 120.
Athens, closed.
Bloomingdale should read, 30 2 39 Whitehall, N. Y., Mont. Co.
Cozzen's Hotel, W. Pt., check West Point.
Dickson, closed.
Dutchess Junction is now W. U. office, square 46; check Fishkill.
Harford Mills, closed.
Lake George, closed.
Locke, closed.
Martin's should read, 30 2 39 Whitehall, N. Y., Mont. Co.
39 Mayville should read 139 Mayville.
Maple Hill, closed.
Overlook Mountain House should read, 35 2 40 Rondout.
Paul Smith's should read 30 2 39 Whitehall N. Y., Mont. Co.
Rosendale, now W. U. office, square 46.
Schagticoke, check Hart's Falls, N. Y.
45 Spring Valley should read 46 Spring Valley.
West Danby, closed.
Woodstock, closed.

ADDITIONS:

74 Amboy Station.
37 Bedford Station.
65 Coventry Station.
57 Clayville.
120 Crittenden.
74 Cato.
74 Camillus.
83 Campbell.
57 Cedarville.
29 East Hampton, L. I.
57 Earlville.
130 Falconers, check Jamestown.
92 Fair Haven.
83 Factoryville.
37 Golden Bridge.
41 Glen Cove, L. I.
120 Grimesville.
Greenpoint, L. I., tariff same as Brooklyn, ck. Brooklyn, L. I.
45 Hart's Falls.
92 Ira.
139 Laona.
74 Minetto.
36 No. Hoosick.
65 No. Norwich.
57 No. Brookfield.
41 Oyster Bay, L. I.
36 Petersburgh, P. O. A. N. Petersburg, N. Y
41 Roslyn, L. I.
46 Sterling Junction.
83 Scipio.
92 Sterling Station, Cayuga Co.
74 So. Granby.
101 South Livonia.
41 Sparkill.
92 Shortsville.
65 Union.
57 Washington Mills.
130 Worksburg, N. Y.

*Black Rock.	20	2	120	Buffalo,	N. Y.
*Clinton Corners	25	2	46	Poughkeepsie,	N. Y
*Franklinville.	45	3	120	Buffalo,	N. Y.
*Ischua.	50	3	120	Buffalo,	"
*Mooresville.	45	3	40	Rondout,	"
*Machias.	45	3	120	Buffalo,	"
*Margaretville.	40	3	40	Rondout.	"
*Moriah Centre.	25	1	39	Whitehall,	Mont. Co
*Pleasant Valley	25	2	46	Poughkeepsie.	

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*Portville.	55	4	120	Buffalo, N. Y.
*Russia.	25	1	39	Whitehall, Mont. Co.
*Stanfordville	25	2	46	Poughkeepsie, N. Y.
*Stissing.	25	2	46	Poughkeepsie, N. Y.
*Stamford.	45	3	40	Rondout.

NORTH CAROLINA.

CHANGES:

116 Kittrell's should read 115 Kittrell's.
Linwood, closed.
104 Warrenton should read 105 Warrenton.

ADDITIONS:

87 Garysburg.
116 Laurinburg.
144 Lilesville.
116 Lumberton.
134 Mebanesville.
115 Morrisville.
98 North West.
144 Rockingham.
87 Seaboard.

NOVA SCOTIA.

CHANGES:

Hillsburg, changed to Bear River.

ADDITIONS:

5 Bear River.

OHIO.

CHANGES:

Alexandria Roads, P. O. A. is New Alexandria, Jefferson Co.
Alma, Henry Co., changed to Deshle.
Belpre, closed.
Berlin Square changed to Ceylon.
Black Hand, P. O. A. is Toboso P. O., Muskingham Co.
Bloomfield, P. O. A. is Fair Play.
Calhoun changed to Windham.
Corwin, P. O. A. is Waynesville.
Dodson, P. O A. is Bachman.
Hubbard, Mahoning Co., should read Hubbard, Trumbull Co.
221 Liberty is in Henry Co.
New Hope, closed.
New Market, P. O. A. is Scio, Harrison Co.
Newton, P. O. A. is Broadway, Union Co.
Pendleton, P. O. A. is So. Pendleton, Hamilton Co.
Plank Road, changed to Randall.
Pleasant Valley, P. O. A. is Plain City.
Seville, P. O. A. is Pike Sta. P. O.
Tippecanoe, P. O. A., Tippecanoe City, Miami Co.
Townsend, changed to Collins.
Urichsville, closed.
Windham Sta. changed to Mahoning.

ADDITIONS:

221 Arcadia.
181 Ava.
201 Brownhelm.
222 Catawba.
181 Caywood.
201 Ceylon.
181 Caldwell.
201 Collin's.
221 Deshle.
253 Elizabethtown.
242 Florence, P. O. A. is Campbellstown, Preble Co.
170 Fairview, Harrison Co.
242 Franklin, Warren Co.
159 Mahoning.
211 Martin.
151 Martin's Ferry.
181 Macksburg, P. O. A. is Regniers' Mill P. O., Wash'n Co.
211 Oak Harbor.
201 Port Clinton.
170 Port Washington.
181 Point Pleasant.
212 Potter.
170 Phillipsburg, P. O. A. is Stone Creek, Tuscarawas Co.
180 Randall.
151 Rush Run.
233 Fosters.
201 Green Spgs.
211 Graytown.
232 Houston,
242 Hughes Sta., P. O. A. is Horrs.
203 Hanging Rock.
203 Haverhill.
191 Independence.
202 Junction City.
212 Kirby.
233 Ludlow Grove.
180 Laurence.
191 Millersburg, Holmes Co.
233 Sharon, P. O. A. is Sharonville.
202 Shawnee.
202 Somerset.
181 So. Olive.
202 Thornfort, P. O. A. is Thornville, Licking Co.
169 Unionville.
201 Venice.
181 Whipple Run.
159 Windham.
212 Woodstock.

*Cumminsville,	25	2	233	Cincinnati, O.
	60	4	213	Chillicothe, O.
	75	5	181	Marietta, O.
*Madeira,	35	2	233	Cincinnati, O.
	55	4	213	Chillicothe, O.
	75	5	181	Marietta, O.
*Monroe Furnace,	75	5	233	Cincinnati, O.
	50	3	213	Chillicothe, O.
	65	4	181	Marietta, O.
	49	3	213	Portsmouth, O.
*Oak Hill,	75	5	233	Cincinnati, O.
	50	3	213	Chillicothe, O.
	60	4	181	Marietta, O.
	40	3	213	Portsmouth, O.
*Raysville,	65	4	233	Cincinnati, O.
	35	2	213	Chillicothe, O.
	60	4	181	Marietta, O.
*Sciotoville,	55	4	233	Cincinnati, O.
	40	3	213	Chillicothe, O.
	65	4	181	Marietta, O.
	25	2	213	Portsmouth, O.
*Webster,	75	5	233	Cincinnati, O.
	55	4	213	Chillicothe, O.
	65	4	181	Marietta, O.
	35	2	213	Portsmouth, O

ONTARIO.

(All Other Line Offices.)

ADDITIONS:

Appin.
Appleton.
Battersea.
Bellamy's
Bracebridge.
Bradford Village.
Brewer's Mill.
Cambray.
Carleton Place Village.
Chesterville.
Crosby Mills.
Elgin.
Enniskillen.
Everton.
Gorrie.
Gravenhurst.
Hampton.
Hawkestone.
Limehouse.
Manilla.
Merriton.
Midland.
Milburne.
Nottawa.
Oakwood.
Parry Sound.
Point Farm.
Port Credit.
Portsmouth.
Rosseau.
Scotland.
Selby.
Severn Bridge.
Smith's Falls Town
St. Williams.
Summerstown.
Thornhill Village
Wendover.
West Port.
Zurich.

OREGON.

ADDITIONS:

Aurora.
Comstock's Mill.
Cornelius.
Jefferson.
Shedds.
St. Joseph.

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PENNSYLVANIA.

CHANGES:

Aqueduct, P. O. A. is Duncannon.
Armstrong Run, closed.
Avenue Drove Yards is now a W. U. office. Tariff same as Philadelphia.
Bigler, Clearfield Co., P. O. A. is Williamsgrove.
Cashup, closed.
Cunningham, changed to East Brady's Bend.
Eagle, P. O. A. is Spread Eagle.
East Foxburgh, closed.
East Liberty P. O. A. is "Station A," Pittsburgh.
East Sandy should read 25 2 more than Oil City, ck. Oil City.
Fullerton is in Lehigh Co.
Harmsburg, closed.
Hawley is now a W. U. office, square 46.
Hestonville and Park Drove Yards are closed. Business will hereafter be delivered from West Philadelphia. Charges for delivery, 25 cents.
Henderson Farm, changed to New London, Warren Co.
Julian, P. O. A. is Julian Furnace.
102 Keating is in Clinton Co.
Lackawanna and Bloomsburg Junc., P. O. A. is Pittston, Pa.
Lehigh Colliery, P. O. A. is Shenandoah.
Lehigh Summit, closed.
Logan Iron Works, Juniata Co., P. O. A. is Lewistown, Pa.
Manayunk is now a W. U. office, tariff 10 cents more than Philadelphia, ck. direct.
McAuley's, closed.
Milford should read 20 2 46 Port Jervis, N. Y.
Milton Farm, should read 25 and 2 more than Oil city, ck. Oil City.
Montrose is now a W. U. office, in square 75; erase square number 196, and the other line tariff.
Oleopolis is another line office, erase sq. number.
Osceola, P. O. A. is Osceola Mills.
Perrysville, P. O. A. is Port Royal, Juniata Co.
Petersburg, Huntingdon Co., P. O. A. is Shavers' Creek.
130 Pine Grove, Warren Co., changed to Russellburg.
Ringtown, closed.
Rockdale is in Delaware Co.; P. O. address is Glen Riddle.
Rockville, P. O. address is Susquehanna, Dauphin Co.
Sandy Ridge, P. O. address is Powelton, Centre Co.
Snow Shoe Intersection, P. O. address is Milesburg.
Southampton, changed to Glencoe.
Spring Brook, Luzerne Co., changed to Moosic.
Steamboat, changed to Glen Loch.
Stemton is in Northampton Co., not Carbon Co., as printed in tariff book.
Sugar Notch is now W. U. office, in square 66; check Wilkesbarre.
Summit, Schuylkill Co., closed.
Tionesta is another line office, tariff for other lines, 25 2 140 Oil City.
Union, P. O. address is Union City.
Wampum, closed.
West Chester Intersection, P. O. address is Paoli.
Yatesville, Schuylkill Co., closed.
Yoders, closed.

ADDITIONS:

140 Antwerp City.
59 Angora.
59 Bingen, ck. Quakertown.
76 Baldwin, ck. Harrisburg.
58 Herrick Centre, Susquehanna Co.
76 Hummelstown.
140 Karn's City.
59 Kutztown.
59 Lincoln University.
52 Bangor.
59 Birdsboro.
140 Catfish.
151 Dixmont.
59 Douglasville.
59 Darby.
131 Elrod.
140 East Brady's Bend.
140 Fairview, Butler co.
59 Fleetwood.
140 Fullerton, Clarion co.
122 Glencoe, P. O. address Southampton Mills.
140 Greece City.
Germantown Junction, tariff 10 cts. more than Philadelphia.
59 Glen Loch.
66 Grand Tunnel Colliery, ck. Wilkesbarre.
66 Girardville.
58 Gouldsboro, Luzerne Co.
151 Hazelwood, check Pittsburgh.
102 Howard, Centre Co.
66 Hauto, ck. Nesquehoning.
66 Lansford, ck. Summit Hill, Carbon Co.
59 Landenburg.
140 Lawrenceburg, check Parker's Land'g.
59 Moselem, P. O. address is Nora, Berk's Co.
150 Mooreheads.
58 Moosic.
140 Millerstown, Butler co.
94 Mt. Union.
59 No. Wales.
66 Nottingham Colliery; ck. Plymouth.
130 New London, Warren Co.
140 Petrolia City.
130 Pioneer.
59 Ridley Park.
94 Richmond Furnace.
130 Russellburg.
112 Roaring Springs.
140 Red Bank.
159 Shenango.
76 Smysers, P. O. address Seven Valley.
150 Shaws.
94 Thompsontown.
130 Triumph.

*Eldred,	55	4	120	Buffalo, N. Y.
*Kimbles,	20	2	46	Honesdale, Pa.
*Keating's Summit, KcKean Co.	65	4	120	Buffalo, N. Y.
*Larabees,	55	4	120	Buffalo, N. Y.
*Port Allegh'ny,	60	4	120	Buffalo, N. Y.
*Wellsboro,	35	2	83	Corning, N. Y.

QUEBEC.

(All Other Line Offices.)

ADDITIONS:

Barnston,
Cap. St. Ignace,
Carrilian Wharf,
Desert,
Gatineau Mills,
Greenville Village,
Hunterstown Mills,
Lachine Locks,
Little Metis,
Longueuil,
Low.
Melbourne.
No. Wakefield,
Nouvelle.
Peche.
Riviere Quelle.
Six Portages.
Soixante.
St. Romuald.
St. Henri.
Upper Wakefield.

RHODE ISLAND.

CHANGES:

Washington, P. O. A. is Coventry.

ADDITIONS:

18 Bristol Ferry, P. O. A. is Portsmouth.
25 India Point, ck. Providence.

SOUTH CAROLINA.

CHANGES:

Greenville should read 85 6 164 Columbia.

ADDITIONS:

146 Green Pond,
165 Grahamville.
175 Graniteville.

TENNESSEE.

CHANGES:

Sewanee should read 50 3 265 Cowan.
Tracey City should read 50 3 265 Cowan.

ADDITIONS:

292 Brentwood,
330 Carroll,
302 Lynnville
340 Middleton.
293 Prospect.
321 Pinson.
311 Stewarts' Sta.

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TEXAS.

CHANGES:

Hallville, closed.
Highland, closed.
Keechie, closed.
Port Lavaca, closed.

ADDITIONS:

484 Crocket.
510 Denison.
511 Dallas.
511 Ennis.
511 Hutchens.
480 Jacksonville.
470 Kilgor.
488 Lake.
490 Ledbetter.
510 McKinney.
500 Mexia.
480 Niches.
470 Overton.
480 Oakwood.
510 Plano.
480 Palestine.
486 Phelps.
484 Riverside.
511 Rice Station.
486 Spring Station.
484 Trinity.
480 Troupe.
486 Willis.

UTAH.

CHANGES:

Promontory, closed.
Schell Creek, closed.
Terrace, closed.

ADDITIONS:

576 Camp Douglass. Tooele City.
Deep Creek. Martinez.

*Farmington,	50	20†	576	Salt Lake City, U.
*Blue Creek,	30	10†		Corinne.
*Hampton,	85	35†		Salt Lake.
*Hebron,	150	15		"
*North Star,	150	15		"
*Pine Valley,	150	15		"
*Richfield,	85	35†		"
*Utah North Junc.	60	25†		"

† Each additional five words or less.

VERMONT.

CHANGES:

Berkshire should read 30 2 30 Stanstead, Que-Mont Co.
Island Pond should read 30 2 30 Stanstead, Que-Mont Co.
Richford is now a W. U. office, square 30.
Sheldon is now a W. U. office, square 38.

ADDITIONS:

30 East Berkshire. 35 West Charlotte.
38 Enosburg Falls.
*Benson Landing 25 1 30 Whitehall, N. Y., Mont. Co.

VIRGINIA.

CHANGES:

Acquia Creek, closed.
Blacks and Whites closed.
Covington is now another line office, tff. for other lines 65 4 96 Richmond.
Jerry's Run, closed.
Strasburg should read 45 3 77 Alexandria, Va.

ADDITIONS:

95 Quantico.

WASHINGTON TERRITORY.

CHANGES:

Pumphrey's, closed.

ADDITIONS:

Cowlitz Sta. Teninio.
English Camp Tacoma.
Hatt's Camp.

*Freeport,	50	20†	Seattle, ck.	San Francisco.
*Port Blankly,	50	20†	"	"
*Port Gamble,	50	20†	"	"
*Port Madison,	50	20†	"	"
*Port Townsend,	50	20†	"	"

† Each additional five words or less.

WEST VIRGINIA.

CHANGES:

Barboursville, should read { 35 2 203 Huntington, W. Va. / 65 4 133 Greenbrier, W. S. Sp., "
Big Bend Tunnel, closed.
Charleston, Kanawha Co., closed. { 50 3 203 Huntington, W. Va. / 65 4 133 Greenbrier, W. S. Sp., "
Coalburg, closed. { 50 3 203 Huntington, W. Va. / 65 4 133 Greenbrier, W. S. Sp., "
Mannington, closed.
Millers' Ferry, closed.
Richmond Falls, closed.
St. Albans, closed. { 40 3 203 Huntington, W. Va. / 65 4 133 Greenbrier, W. S. Sp. "
Stretcher's Neck, closed.

ADDITIONS:

*Alderson. { 35 2 203 Huntington, W. Va. / 65 4 133 Greenbrier, W. S. Sp., "
*Hurricane. { 40 3 203 Huntington, W. Va. / 65 4 133 Greenbrier, W. S. Sp., "
*Hinton. { 65 4 203 Huntington, W. Va. / 50 3 133 Greenbrier, W. S. Sp., "
*Hawk's Nest. { 60 4 203 Huntington, W. Va. / 60 4 133 Greenbrier, W. S. Sp., "
*Kanawha Falls. { 60 4 203 Huntington, W. Va. / 65 4 133 Greenbrier, W. S. Sp., "
*Meadow Creek { 65 4 203 Huntington, W. Va. / 50 3 133 Greenbrier, W. S. Sp. "
*McKinderee. { 65 4 203 Huntington, W. Va. / 50 3 133 Greenbrier, W. S. Sp., "
*Ronceverte. { 65 4 203 Huntington, W. Va. / 35 2 133 Greenbrier, W. S. Sp., "
*Sewell. { 65 4 203 Huntington, W. Va. / 60 4 133 Greenbrier, W. S. Sp., "
*Talcott. { 65 4 203 Huntington, W. Va. / 40 3 133 Greenbrier, W. S. Sp., "

WISCONSIN.

CHANGES:

Worthington, no office.

ADDITIONS:

316 Lyons.

*Glenbeulah,	50	3	307	Chicago,	Ill.
*Lavalle,	60	4	307	"	"
*New London,	75	5	307	"	"
*Oakfield,	50	3	307	"	"
*Orford,	40	3	307	"	"
*Princeton,	60	4	307	"	"
*Pickets,	60	4	307	"	"
*Randon Lake,	35	2	307	"	"
*Seymour,	75	5	307	"	"
*Waldo,	85	2	307	"	"
*Wauwatosa,	35	2	307	"	"

WYOMING.

CHANGES:

Bitter Creek is now another line office. Tariff for other Lines 55 4 456 Rawlins, Wy.
Black Butts should read 65 4 564 Rawlins
Carbon should read 55 4 556 Laramie City.
Hallville, closed.
Medicine Bow is now another line office. Tariff for other lines 55 4 556 Laramie City.
Point of Rocks should read 65 4 564 Rawlins.
Red Desert should read 55 4 564 Rawlins.
Rock Creek should read 55 4 556 Laramie City.
Table Rock should read 55 4 564 Rawlins.
Van Dyke's, closed.

ADDITIONS:

556 Fort Sanders. 570 Camp Stambaugh.
570 South Pass.

(Page 254.)

Erase from list of half-rate offices, on page 254, all offices in Florida except Pensacola. Add Molino and Milton, Fla., as half-rate offices.
Erase note at foot of page 254, relating to half-rate business for Montreal.

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THE WESTERN UNION COMPANY AND THE *ALTA CALIFORNIA.*

In the matter between the Western Union Telegraph Company and the *Alta California*, a newspaper published at San Francisco, which was recently deprived of the privilege of receiving dispatches free of cost over the Company's lines, General Superintendent Gamble publishes the following card :

TO THE PUBLIC.

OFFICE OF THE PACIFIC DIVISION W. U. T. Co.,
SAN FRANCISCO, January 21, 1873.

The *Alta California* of to-day publishes a long article in which it attempts to convey the false impression that the action of the telegraph company in terminating the *Alta's* Pacific Coast dispatches was prompted by the stand which the *Alta* has recently taken upon the postal telegraph question. The correspondence which they publish clearly shows the actual necessity for stopping their dispatches, as they acknowledge that they did not even make a partial payment until after receiving formal notice of intended stoppage of dispatches. Had the *Alta* published all the correspondence which passed during the year 1872, upon the subject of the non-payment of their bills, the fact would have been shown that their Pacific Coast dispatches were suspended from October 26th until October 31st, to enforce a settlement of their bills for the months of March, April, May, June, July, August and September ; and they were resumed only upon the assurance of the publishers of the *Alta* that the telegraph company should suffer no further annoyance in that respect.

It is a significant fact that the *Alta* did not favor the Postal Telegraph until after the above-mentioned transaction. Instead of meeting their obligations promptly, as they had promised, the publishers of the *Alta* paid us nothing on account of October, November and December bills until payment was again enforced in the usual manner. Having become wearied of the great difficulty and annoyance of collecting money from the *Alta*, the Company decided to dispense with their patronage, and notified them accordingly.

That the charge of malicious intent to injure the *Alta*, because of its position on the Postal Telegraph question is a mere subterfuge and entirely without foundation in fact, is further shown by the fact that only a few days prior to the stoppage of the *Alta's* dispatches we effected an arrangement—at commuted rates—to transmit Pacific Coast dispatches to the *San Francisco Chronicle*, a paper which was at the time and still is a strong advocate of Postal Telegraphy. If it were the policy of the Company to punish newspapers for advocating such propositions, it would have positively declined negotiations with the *Chronicle.*

The general press of the United States is divided upon the subject of Postal Telegraphy, and the Telegraph Company has not assumed to question the right of its newspaper patrons to advocate the scheme—they have only demurred in cases where wanton and malicious attacks were made on the credit of the Company because they insisted upon the payment of just dues for services rendered.

JAMES GAMBLE,
General Superintendent.

DOMINION TELEGRAPH COMPANY.

THE fourth annual meeting of the Dominion Telegraph Company was held at noon on the 12th of February, in the Company's offices, corner of Church and Wellington streets, Toronto.

Hon. John McMurrich took the chair, and opened the proceedings by stating the object of the meeting. He said he was pleased to see so many present, and that they could meet in their own premises on this occasion. The Directors had nothing very great to submit to them, but what would be submitted would be on the whole gratifying, They had now got over the centre, and the prospects of the Company were brighter than they had ever been before.

From the report submitted by the Directors, we gather that up to the close of the year 1870, the Company had erected 629 miles of poles, strung 1,116 miles of wire, and put 33 offices in operation in the Province of Ontario.

In the last Annual Report it was shown that the pole mileage had been increased to 1,176 miles, the wire mileage to 2,265, and the number of offices increased to 83 during the year 1871. The Company had also, within the same year, acquired by purchase, the Peoples' Line, thus extending their operations to the sister Province of Quebec, and adding to their working lines 334 miles of poles, 668 miles of wire, and 23 offices.

During the past season they have added to the pole mileage 667½ miles of poles, have strung 1,099 additional miles of wire, and opened 58 new offices.

In this is included 153 miles of poles and a double wire line from Ogdensburg to Oswego, built under a renewable lease of 99 years, from the Atlantic and Pacific Telegraph Company of the State of New York.

Authority was voted by the meeting to issue new stock to the amount of $100,000 for further extensions, and to cover a deficiency incurred in past operations.

Hon. John McMurrich was re-elected President ; John I. McKenzie, Esq., of Hamilton, Vice-President ; and James Michie, Esq., Treasurer.

THE GREAT WESTERN TELEGRAPH COMPANY.

THE Stockholders of the Great Western Telegraph Company met at Chicago, Ill., on the 29th of January, for the election of a new Board of Directors. About 300 subscribers were present.

The reasons for the meeting were briefly stated by Mr. J. Stark.

The President's report was called for and read by Mr. Gage. In reference to the charge of a fraudulent design to exclude the stockholders from participation in the management of the affairs of the company, the report stated that "The first By-law, adopted March, 1868, read as follows : 'The first annual meeting of the stockholders of the Great Western Telegraph Company shall be held within ninety days after the first division of two thousand miles of the Company's lines of poles shall have been equipped with wire, and on the second Tuesday in January each year thereafter, at two o'clock, at such place as the directors of the company may direct.' I would beg leave to state, that, at the time this By-law was adopted, it was not the intention to cut off a participation by the stockholders in the business affairs of the company. I am confident such a purpose never entered into the minds of the directors. It was decided that if some plan was not adopted to prevent the friends and advocates of powerful rivals from subscribing for a controlling interest, the plans and purposes of the Great Western Telegraph Company would be defeated at the outset of the enterprise. The United States, American, Illinois, and Mississippi, Pacific, and a large number of other telegraph companies, have, one after another, been absorbed, and it was thought practicable and easy to arrange the By-laws so as to prevent any interference by designing men, to pervert the establishment of our telegraph scheme. If, after the company had grown to a self-supporting and profitable position, the stockholders themselves chose to sell out their lines, they could do so. But the first directors intended to prevent such a calamity, and desired to hand over to the stockholders a range of lines worth controlling as soon as they could be built and put in operation."

The report of the Treasurer was called for, but he did not respond, and Mr. Gage said the Treasurer was absent ; and if he was there and reported, it would be a statement of so much money received, so much paid out, and nothing in the treasury.

Much dissatisfaction was manifested at this, and, after a long discussion, the following resolution was offered and adopted :

Resolved, That the Treasurer of this Company be requested to furnish to the directors of this Company a detailed financial statement of the condition of this Company, giving the amount and names of all persons who have paid money, and also the names of all persons to whom he has paid money, with the amounts paid each ; also, that he report the amounts of debt due from this Company, to whom due, and also the amounts of all judgments rendered against the Company, with the names of the plaintiff or plaintiffs.

At a meeting of the directors, held February 7, the following officers of the company were elected :

President—JOSHUA STARK.
Secretary and General Agent—O. D. BOND.
Treasurer—M. TABOR.
General Superintendent—A. H. BLISS.

THE SOUTHERN AND ATLANTIC TELEGRAPH COMPANY.

A circular recently issued to the stockholders of the Southern and Atlantic Telegraph Company by the President, Mr. James R. Crenshaw, approved by the Executive Committee, states that the company have now completed and in operation 1,603 miles of line, with 3,002 miles of wire, and have offices at twenty-three cities and towns, and have issued 17,356 shares of capital stock, or $433,900. When the extensions recommended are completed, and which can certainly be done by placing at par as many shares of the capital stock as will make a total issue of 24,000 shares, or $600,000, the gross receipts cannot prove less than $200,000 per year, of which, it is stated, one half would be net profit. and may double that.

THE ATLANTIC AND PACIFIC TELEGRAPH COMPANY.

At a meeting of the Trustees of the Atlantic and Pacific Telegraph Company, held at the executive office of the company in this city, on Friday, February 7th, the following officers were elected for the ensuing year: President, John Duff: Vice-President, William H. Guion; Treasurer, G. S. Bowdin ; Secretary, Alfred Nelson; Executive Manager, E. D. L. Sweet.

It appears from the report of the Executive Manager, Mr. E. D. L. Sweet, made to the stockholders at the annual meeting, held January 29th, that greater progress was made by the company in 1872 than in any previous year since its organization. During the year more than two thousand miles of line were added to those previously occupied by the company.

The company claims to be entirely free from debt of every description, and its affairs are represented to be in a healthy condition, and the business since April, 1872, has shown a considerable profit or surplus monthly. This surplus has been expended, under the direction of the trustees, in paying for the new lines, and in extensive improvements over the entire routes of the company.

NEW ADVERTISEMENTS.

M. A. Buell, Cleveland, O., Telegraph Supplies.

Watts & Co., Baltimore, Md., Instruments and Batteries.

Leclanché Battery Co., New York.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY,
December, 1872.

APPOINTMENTS.

Allen, S. C.....Station H, New York City.
Bennett, W. M.....145 Broadway, "
Bennett, E. C.....Madison Square, "
Collester, J. S.....145 Broadway, "
Dennison, R, G. W.....
Doughty, T. T.....
Egan, Thos. J.....5th Ave. Hotel, "
Fairchild. Jennie.....Worth St. & Broadway, N. Y.
Kechler, W. P.....Grand Gentral Depot, N. Y. C.
Linder, Isabella J.....145 Broadway, New York City.
North, J. W.....St. Nicholas Hotel, "
Phillips, W. P.....145 Broadway, "
Powers, J. J.....
Smith, Helen E.....Yorkville, "
Tubbs, W. J.....Dry Dock, "
Hoyt, Geo. S.....Annapolis, N. S.
Robbins, Mary.....
Jodrey, Jacob.....Halifax, "
Webster, Wm.....Truro, "
Sancton, W. A.....Sussex, N. B.
Dellingham, Miss Kate.....Augusta, Me.
Brimmer, M. C.....Ellsworth, Me.
Davis, M. E.....Harrington, Me.
Snow, Miss C. H.....Newburyport, Mass.
Jenkins, W. B.....Portsmouth, N. H.
Stickney, O. D.....Portland, Me.
Gravis, W. P.....South Berwick Junction, Me.
Corey, Fred A.....Athol, Mass.
Story, W. H.....Hillsboro Bridge, N. H.
Trenholm, Mary R.....Northumberland, "
Brown, W. R.....West Andover, "
Smith, Miss C. N.....Kingston, R. I.
Woodbridge, C. W., appointed Manager Vice *R. S. Raymond, died December 1st.*.....New London, Conn.
Howe. Kate.....Palmer, Mass.
Newcomb, Wm.....Stamford, Conn.
Beals, Ella A.....Stoughton, Mass.
Fields, Miss H. M.....Watertown, Conn.
Holt, Miss L. E.....Boston, Mass.
Leahy, Timothy.....
Gray, J. W.....Brewsters, N. Y.
Dawson, Geo.....Pawlings, "
Adams, W. T.....Canastota, "
Borden, James.....Avenue Drove Yards, Pa.
Biedlew, H. P.....Chester, Pa.
Harrison, W. H.....Annapolis, Md.
Strong, Albert E.....Baltimore, Md.
Fisher, H. M.....Birdsboro, Pa.
Borden, Jas.....Bridgeton Depot, N. J.
Bressler, John.....Hummelstown, Pa.
Shine, M. P.....Mauch Chunk, Pa.
Harris, Miss.....Morristown, N. J.
Gegan, John J.....Newark, N. J.
Pattison, Joseph.....New Castle, Del.
Gledden, F. T.....Washington, D. C.
Reed, W. L.....Council Bluffs, Iowa.
Davis, John P.....Union Stock Yards, Ill.
Stearns, C. A.....Chicago, Ill.
Thayer, C. W.....
Armstrong, E. L.....
Unwin, J. W.....
Wallace, Wm.....
Miller, Geo. E.....Atchison, Kansas.
Fish, John M.....Kansas City.
Smith, Eugene L.....
McIlwaine, Jas. C.....St. Louis, Mo.
Clark, Chas. M.....
Griffiths, Frank W.....
Sinclair, John F.....
Austin, W. H.....Denver, Col.
Kingsbury, Fred. W.....Fort Sanders, Wyoming.
St. Clair, W. P.....Kearney Junction, Neb.
Soule, C. S.....Omaha, Neb.
Sheets, Ed.....
Painter, L. M.....Salt Lake, Utah.
Clarke, M. E.....McKeesport, Pa.
Brady. J. J.....Pleasantville, Pa.
Duncan, J. A.....Red Bank, Pa.
Ackerly, J. E.....Shamburg, Pa.
Carpenter, F. E.....Bay City, Mich.
Brewer, R. W.....Fort Wayne, Ind.
Worthington & Sons.....Grindstone City, Mich.
Vincent, S. N.....Lapeer, Mich.
St. John, O. S.....Marshall, Mich.
Weeks, C. H.....Millersburg, Ohio.
Stringer, Robt. E.....Evansville, Ind.
Livingstone, Robt.....Indianapolis, Ind.
Smith, J. J.....Athens, Ohio.
Wires, W. H.....Cambridge, Ohio.
Flood, J. C.....Columbus, Ohio.
Walker, J. D.....Cincinnati, Ohio.
Robinson, C. C.....
Huxford, S. H.....
Henry, H. H.....
Hancock, B. W.....Boon Hill, N. C.
Benson, J. G.....Hanover C. H., N. C.
Royal, J. J.....Lumberton, "
Rady, H. S.....Richmond, Va.
Burns, S. C.....
Waldron, W. B.....Warsaw, N. C.
Cecil, C. W.....Liberty, Va.
Biser, Miss I. F.....Aiken, S. C.
Pusey, W. H.....Charleston, S. C.
Boyle, John F.....Columbia, S. C.
Williams, M. L.....Savannah, Ga.
Lockard, J. A.....Artesia, Miss.
Jennings, T. J.....Cowles Station, Ala.
Stiger, W. T.....Egypt, Miss.
Hudson, J. B.....Jacksonville, Ala.
Hart, M. C.....Mobile, Ala.
Brick, Morris.....
Pride, H.....Montgomery, Ala.
Smithson, J. C.....State Line, Miss.
Vestal, Chas. R.....Hartsville, Ala.
Miller, W.....Warrior, "
Flint, F. W.....McComb City, Miss.
McGlattery, F.....Vaidea, Miss.
Sadler, W.....Wests, "
Powell, J. H.....Brandon, "
McElroy, R. M.....Newton, "
Pendarus, Geo. H.....Tickfaw, La.
Edwards, J. N.....Brownsville, Tenn.
Pilot, P. E.....Danville, "
Abbey, R. U.....Sardis, Miss.
Johnson, W. R.....Collinsville, Tenn.
Turner, S. C.....Rutherford, "
Snodgrass, John.....Scottsboro, Ala.
Sheldon, J. B.....Lebanon Junction, Tenn.
Sands, Jacob.....Brentwood, Tenn.
Spink, G. L.....Horse Cave, Ky.
Howell, J. O.....Lynnville, Tenn.
Payne, J. R.....Nortonville, Ky.
Delgade, Philip.....El Dorado, Ark.
English, George.....Vienna, La.
Bucklin, W. B.....Bremond, Texas.
Burd, D. E.....Ennis, "
Blattner, F. W.....Jacksonville, Texas.
Parkes, T. W.....Palestine, "
Callahan, P. L.....Spring, Texas.
Carsner, C. F.....Victoria, Texas.
Young, J. P.....Riverside, Texas.
Reed, C. M.....Algiers, La.
Cooper, Thos. C.....Chef Mentner, La.
Healy. J. K.....Pass Christian, La.
Acherson, W. E.....Tacoma, W. T.
Gamble, John L.....San Francisco.
Oldham, J. C.....Alta Cala.
Bobo, L. B.....Cisco.
Cowan, E.....Steamboat, Nev.
Eddy, Belle.....San Rafael, Cal.
McGrew, C. O.....Petroliopolis, Cal.
Reed, B.....Washburns, Nevada.
Jones, James.....Oroville, Cal.
Gove, E. S.....Santa Barbara, Cal.
Swain, Jas. F.....Mills Seminary, Cal.
Bloomfield, ——.....Dixon, Cal.
Thomas, E. G.....Stockton, Cal.
Taylor, C. H.....Elko, Nevada.
Hatton, O. C.....Virginia, Nevada.
Buttolph, H. L.....Oreana, Nevada.
Bross, H. L.....Franktown, Nevada.

RESIGNATIONS.

Applebaugh, W. K.....145 Broadway.
Bell, J. C.....
Burns. S. C.....
Livingston, R.....
Mullackey, P.....
Welp, H.....Grand Central Depot, N. Y. C.
Wortman, E. P.....145 Broadway.
Lenhart, John.....
Vaesner, Minnie.....
Williams, R. J.....
McCullum, W.....Metropolitan Hotel, N. Y. City.
Waudle, W. H.....Fifth Ave. Hotel, "
Harley, Miss L.....Halifax, N. S.
McDonald, J. A.....Plaister Cove, C. B.
Archibald, L. B.....Truro, N. S.
Sewall, C. H.....Portland, Me.
Harvey, Fred.....Athol, Mass.
Newell, E. T.....Hillsboro Bridge, N. H.
Fowler, W. H.....Northumberland, "
Mason, H. K.....West Andover, "
Swan, Frank H.....Fall River, Mass.
Adams, B. B., Jr.....Palmer, "
Greene, J. W.....Providence, R. I.
Wright, Frank.....Stamford, Conn.
Cooke, E. C.....Worcester, Mass.
McKennon, Miss E. F.....Boston, "
Davin, E. J.....
Weeks, A.....Brewsters, N. Y.
Ellis, W. H.....Pawling, "
Morrison, N. E.....Canastola, "
Van Wormer, J. R.....Oswego, "
Hallenstein, I.....Baltimore, Md.
Mills, C. J.....Elizabeth, N. J.
Smith, Miss.....Morristown, N. J.
Hatch, C. L.....Philadelphia.
Hill, S. P.....Washington.
Wilkins, B. C.....Clinton, Ia.
Ward, C. H.....Des Moines
Peppitt, A. R.....Quincey, Ill.
Ryan, M.....Chicago, Ill.
Swift, E. S.....
McKeever, P.....
Dexter, Myra J.....
Lewis, W. S.....
Stone, O. M.....
Curry, A.....
Todd, E. E.....Fort Scott, Ks.
Redfield, W. A.....St. Joseph, Mo.
Hauchett, John C.....St. Louis, Mo.
Keene, Jas. P.....
Marsh, Robert.....
Wheeler, Thos. P.....
Nichols. Horace W.....
Rourke, James.....Bitter Creek, Ky
Hay, C. D.....Denver, Col.
Harter, F. W.....Omaha, Neb.
Webster, G. C.....
Fitzpatrick, John F.....Salt Lake, Utah.
Fisher, M. E.....McKeesport, Pa.
Langworthy, L. A.....Pleasantville, Pa.
McCready, R. C.....Bay City, Mich.
Felton, M. R.....Duncan City, Mich.
Jenny, E. C.....Sandusky, O.
Houlahan, James.....Detroit, Mich.
Stewart, Margaret.....
Slacer, W. H.....Buffalo, N. Y.
Davis, W. G.....Toledo, O.
Roberts, S. B.....Indianapolis, Ind.
Vincent, O. B.....Athens, O.
Brown, J. K.....Cambridge, O.
Wilson, M. L.....Cincinnati, Ohio.
Landy, W. J.....
Spriggs, S. D.....
Adams, F. G.....
Dabucy, C. T.....Hanover Court House, N. C.
McCauley, Jas. M.....Warsaw, N. C.
Lockwood, Jas. A.....Liberty, Va.
North, J. W.....Aiken, S. C.
Birchett, F. W.....Artesia, Miss,
Polk, S. W.....Egypt, "
Terry, T. R.....Montgomery, Ala.
Rose, T. S.....State Line, Miss.
Burns, Joe.....Lebanon Junction, Tenn.
Haviland, E. L.....Ennis, Texas.
Dunbar, J. K.....Indianola, Texas.
Ritchie, D. B.....Millican, "
Ector, W. B.....Palestine, "
Flynn, Edward.....Algiers, La.
Ferris, J. W.....Chef Mentner, La.
Sullivan, P. W. O.....Pass Christian, La.

TRANSFERS.

	From	*To*
Atwater, H. H.	21 Wall st., N. Y.	Board of Brok'rs, N. Y.
Brown, A. D V.	Brooklyn	Relief Service.
Cooke, Josie A.	145 Broadway.	Cooper Union, N. Y.
Carroll, P.	Station H, N. Y.	Gr'd Cent. Dep., N. Y.
Doig, James.	6th Ave. & 43d St.	Gr'd Cent. Hotel, N. Y.
Holmes, Miss J.	145 Broadway	Brooklyn.
Jennings, C. H.	134 Pearl Street	21 Wall Street.
Lawney, Miss G.	Cooper Union	Astor Place & B'way.
Miles, Sarah J.	Dry Dock	Brooklyn.
Noble. Lizzie M.	Whitehall, N. Y.	145 Broadway.
Shaw, Cassie.	349 Broadway	145 Broadway.
Wallace, Susie.	Worth and B'way	117 Worth Street.
Lockwood, F. W.	Annapolis, N. S.	St. Andrews, N. B.
Foster, J. J.	St. Andrews, N. B.	Halifax, N. S.
Moffitt, Jas. M.	Philadelphia.	Plaister Cove, C. B.
Bailley, David	Windsor, N. S.	Truro, N. S.

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Cleveland, F. H.	Sussex, N. B.	Shediac, N. B.
Meek, Miss J. L.	Braintree, Mass.	So. Dedham, Mass.
Briggs, Lizzie M.	Kingston, R. I.	Providence, R. I.
Thayer, Miss E. F.	So. Dedham, Mass.	Braintree, Mass.
Eastlake, W. O.	Philadelphia	Washington, D. C.
McEnroe, W. H.	Jersey City	" "
Williamson, H.	Oswego, N. Y.	Rochester, N. Y.
Kimberly, Geo. B.	Annapolis, Md.	Baltimore.
Nungesser, H. J.	Mauch Chunk, Pa.	Elizabeth, Pa.
Hartman, J. A.	Newark, N. J.	Jersey City.
Sedgwick, W. F.	Council Bluffs, Iowa.	Sioux City, Iowa.
Moore, E. D.	Chicago, Ill.	Quincy, Ill.
Cochran, A. P.	Atchison, Kansas.	Lincoln, Neb.
Irwin, Geo. W.	Kansas City, Mo.	St. Louis, Mo.
McCauley, P. N.	Kansas City, Mo.	Topeka, Kansas.
Buckingham, H. P.	Lincoln, Neb	St. Joseph, Mo.
Ernesthanser, Wm.	Topeka, Kansas.	Fort Scott, Kansas.
Rawlings, C. C	St. Louis, Mo.	Lincoln, Neb.
Grier, T. J.	Salt Lake, Utah.	Corinne, Neb.
Grier, W. J.	" "	" "
Kearney, P.	Corinne, Neb.	Salt Lake, Utah.
Baker, W. P.	" "	" "
Mantle, Lee	Junction, Mont.	Summit, Ind.
Irwin, W. A.	Shamburgh, Pa.	Oil City, Pa.
Miller, T. M.	Toledo, Ohio.	Sandusky, O.
Troy, T. O.	Boon Hill, N. C.	Durham, N. C.
Gaines, Geo. B.	Richmond, Va.	Tredegar, Va.
Mills, G. D.	Mobile, Ala.	Breaham, Texas.
Whitaker, E. W.	Rutherford, Tenn.	Booneville, Miss.
English, Geo.	El Dorado, Ark.	Vienna, La.
McDaniel, C. A.	Bremond, Texas.	Millican, Texas.
Lee, J. H.	Brenham, Texas.	Houston, Texas.
Westervelt, W. J.	Jacksonville, Texas.	Plane, Texas.
Woodworth, S. T.	Victoria, Texas.	Indianolo, Texas.
Henery, Wm.	Steamboat, Nevada.	Gold Hill, Nevada.
Donelin, I. F.	Elko, Nevada.	Winnemucca, Nev.
Plummer, O. A.	Oroville, Cal.	E. Portland, Oregon.
Bennett, H. M.	Stockton, Cal.	Oakland, Cal.
Furst, L.	Dixon, Cal.	Davisville, Cal.
Tingman, W. J.	Reno, Nevada.	Carson, Nevada.

A NEW DESTINATION FOR THE PROJECTED GREAT WESTERN CABLE.

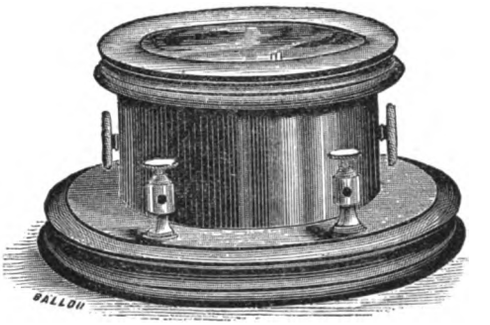
It is stated by the *Railway News*, of London, in its January 18th issue, that the opposition cable company, the Great Western, which was to have laid a competing cable during the Summer, has been bought off. The cable is already well advanced in manufacture. The *News* says:

"A short time since it was proposed, by an entirely independent company, to lay a cable between these countries and the United States, in competition with those of the Anglo-American and French companies. At the time the prospectus was published, we pointed out how little necessity there was for such an undertaking, especially as the French company was about to lay down a second cable, in accordance with the terms of its agreement with the New York, Newfoundland and London Tel. Co. We consider that four cables would, for some years to come, be amply sufficient to conduct the telegraphic business between Europe and North America; that the laying of the fifth would lead, for a time, to ruinous competition and eventuate in an amalgamation—in other words, there would be a greater amount of capital to participate in the net earnings, and a corresponding reduction of dividend. We now learn that the Great Western Telegraph Company themselves have come over to our views, for they have now determined to alter the destination of their cable, which is nearly finished, and employ it as a means of connecting us with Brazil and the Plate District, thereby rendering good service to the cause of progress in South America. The old companies are thus left in uncontrolled possession of the traffic to which their enterprise fairly entitles them—the Anglo-American Company and the French Atlantic collecting the business on this side of the ocean, to be distributed on the other side by the New York, Newfoundland and London Company, and receiving in their turn, all the messages collected on the American continent by that company, to be forwarded all over Europe and Asia—nay, even to the Antipodes.

M. A. BUELL,

Manufacturer and Dealer in

TELEGRAPH SUPPLIES.



THE LITTLE MONITOR RELAY

Is a substantially made and good working Instrument, incased in a polished Rubber Cylinder with Plate Glass Cover, has back and front Adjustment.

EVERY INSTRUMENT WARRANTED.

Price, $10.00.

Also, LITTLE MONITOR SOUNDER, to match,
Price, $6.00.

And Small Size W. U. KEY,
Price, $4.00.

All kinds of Learner's Instruments, with Instructions, constantly on hand. Send for Circular.

M. A. BUELL,
26 WARING BLOCK,
CLEVELAND, O.

THE

LECLANCHÉ BATTERY CO.

Is now prepared to supply promptly the increasing demand for

This Celebrated Battery,

(SECURED BY LETTERS PATENT IN THIS COUNTRY)

and which is extensively used throughout Europe for

TELEGRAPHY,
RAILROAD SIGNALS,
HOTEL ANNUNCIATORS,
BELLS, ETC.

Among the numerous advantages of this Battery may be mentioned—

ENTIRE ABSENCE OF ACIDS,
ITS GREAT CLEANLINESS,
WONDERFUL DURABILITY,
GREAT ECONOMY IN RUNNING EXPENSES.

This Battery will last, without any Attention, from six months to a year.

A number of cups have been in use by the Western Union Telegraph Company, *on a closed circuit*, since Nov. 26, 1872, nothing but water having been added since they were first set up.

For further particulars apply to

THE LECLANCHÉ BATTERY CO.,

No. 40 West 18th St., N. Y.,

OR

L. G. TILLOTSON & CO.,

SOLE AGENTS,

No. 8 Dey Street, New York.

WATTS & COMPANY,

Baltimore,

MANUFACTURERS OF

Electrical and Telegraph Instruments

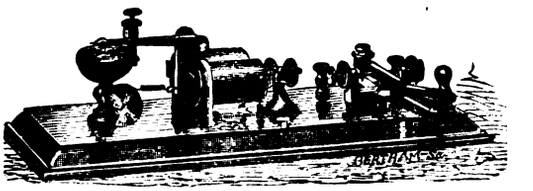
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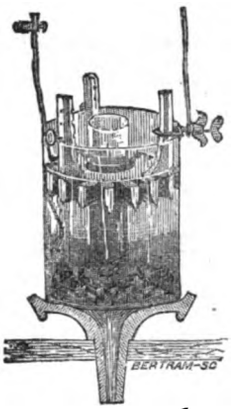
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 8. NEW YORK, MARCH 15, 1873. WHOLE NO. 129.

MEASUREMENT OF ELECTRICAL FORCES.

Coulomb, who was the first to make electricity an accurate science, employed in his researches an instrument which is often called after his name, and which is still extensively employed. It depends on the principle that the torsion of a wire is simply proportional to the twisting couple. We shall first describe it, and then point out some of its applications:

It consists of a cylindrical glass case A A (Fig. 1), from the upper end B of which rises another glass cylinder D D of much smaller diameter. This small cylinder is fitted at the top with a brass cap *a*, carrying an index C. Outside of this, and capable of turning round it, is another cap *b*, the top of which is divided into 360 equal parts. In the centre of the cap *b* is an opening through which passes a small metal cylinder *d*, capable of turning in the opening with moderate friction, and having at its lower end a notch or slit. When the cap *b* is turned, the cylinder *d* turns with it; but the latter can also be turned separately, so as not to change the reading. These parts compose the *torsion-head*. A very fine metallic wire is held by the notch, and supports a small piece of metal, through which passes a light needle of shellac *f*, carrying at one end a small gilt ball *g*. A circular scale runs round the outside of the large cylinder in the plane of the needle. Finally, opposite the zero of this scale, there is a fixed ball *g'* of some conducting material, supported by a rod *f*, of shellac, which passes through a hole in the cover of the cylindrical case.

To illustrate the mode of employing this apparatus for electrical measurements, we shall explain the course followed by Coulomb in investigating the law according to which electrical repulsions and attractions vary with the distance. The index is set to the zero of the scale. The inner cylinder *d* is then turned, until the movable ball just touches the fixed ball without any torsion of the wire. The fixed ball is then taken out, placed in communication with an electrified body, and replaced in the apparatus. The electricity with which it is charged is communicated to the movable ball, and causes the repulsion of this latter through a number of degrees indicated by the scale which surrounds the case. In this position the force of repulsion is in equilibrium with the force of torsion tending to bring back the ball to its original position. The graduated cap *b* is then turned so as to oppose the repulsion. The movable ball is thus brought nearer to the fixed ball, and at the same time the amount of torsion in the wire is increased. By repeating this process, we obtain a number of different positions in which repulsion is balanced by torsion. But we know, from the laws of elasticity, that the force (strictly the couple) of torsion is proportional to the angle of torsion. Hence we have only to compare the total amounts of torsion with the distances of the two balls. By such comparisons Coulomb found that the force of electrical repulsion varies *inversely as the square of the distance.*

The following are the actual numbers obtained in one of the experiments. The original deviation of the movable ball being 36°, it was found that, in order to reduce this distance to 18°, it was necessary to turn the head through 126°, and, for a farther reduction of the deviation to 8°.5, an additional rotation through 441° was required. It will thus be perceived that at the distances of 36°, 18°, and 8°.5,

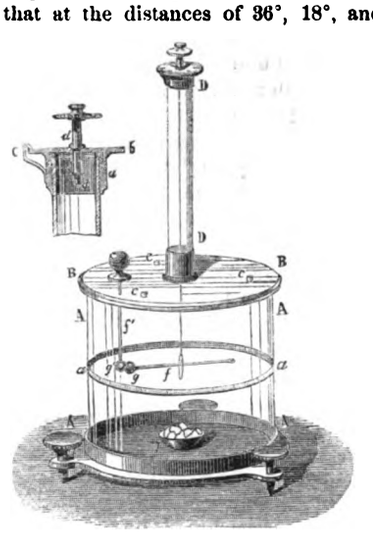


Fig. 1.

which may be practically considered as in the ratio of 1, ¼, and ¼, the forces of repulsion were equilibrated by torsions of 36°, 126°+18°=144°, and 441+126+8.5=575°.5 respectively. Now 144 is 36×4, and 575.5 may be considered as 576, or 36×16. Hence we perceive that, as the distance is divided by 2, or by 4, the force of repulsion is multiplied by 4 or by 16, which precisely agrees with the law enunciated above.

We must, however, observe that in this mode of reducing the observations, two inaccurate assumptions are made. First, the distance between the balls is regarded as being equal to the arc which lies between them, whereas it is really the chord of that

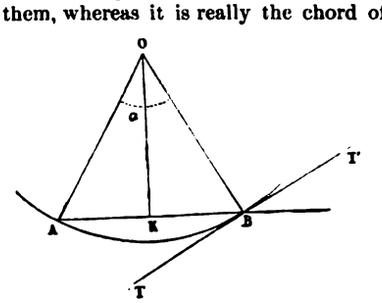


Fig. 2.

arc. Secondly, the force of repulsion is regarded as acting always at the same arm, whereas its arm, being the perpendicular from the centre on the chord, diminishes as the distance increases. The following investigation is more rigorous:

Let A O B (Fig. 2), the angular distance of the balls, be denoted by a, and let l be the length of the radius O A. Then the chord A B is $2l \sin \frac{1}{2} a$, and the arm O K is $l \cos \frac{1}{2} a$. Let f denote the force of repulsion at unit distance, and n the couple of torsion for 1°. Then the force of repulsion in the given position is $\frac{f}{4l^2 \sin^2 \frac{1}{2} a}$ if the law of inverse squares be true, and the moment of this about the centre is $\frac{f \cos \frac{1}{2} a}{4l \sin^2 \frac{1}{2} a}$, which must be equal to n A, if A be the number of degrees of torsion. Hence we have

$$\frac{f}{4nl} = \text{A} \sin \tfrac{1}{2} a \tan \tfrac{1}{2} a,$$

and as the first member of this equation is constant, the second member must be constant also for different values of A and a, if the law of inverse squares be true. The degree of constancy is shown by the following table:—

	a	A	A sin ½ a tan ½ a
1st experiment, . .	36	36	3·614
2d experiment, . .	18	144	3·568
3d experiment, . .	8·5	575·5	3·169
Supposed case . .	9	576	3·557

The difference between the first and second numbers of the last column is insignificant. That between the second and third is more considerable, but in reality only corresponds to an error of half a degree in the measurement of the arc.

We have already seen that the mutual induction of two conductors tends to diminish their mutual repulsion, and that this inductive action becomes more important as the distance is diminished. Hence the repulsion at distance 9 should be less than a quarter of that at distance 18. The apparent error thus confirms the law.

Many persons have adduced, as tending to overthrow Coulomb's law of inverse squares, experimental results which really confirm it. Except when the dimensions of the charged bodies are very small in comparison with the distance, the observed attraction or repulsion is the resultant of an infinite number of forces acting along lines drawn from the different points of the one body to the different points of the other. The law of inverse squares applies directly to these several components, and not to the resultant which they yield. The latter can only be computed by elaborate mathematical processes.

It is incorrectly assumed in the text that the law ought to apply directly to two spheres, when by their distance we understand the distance between their nearest points. It is not obvious that the distance of the nearest points should give a better result than the distance between the centres.

The law of attractions may be investigated by a similar method. The index is set to zero, and the central piece is turned so as to place the movable ball at a known distance from the fixed ball. The two balls are then charged with electricity of different kinds. The movable ball is accordingly attracted towards the other, and settles in a position in which attraction is balanced by torsion. By altering the amount of torsion, different positions of the ball can be obtained. On comparing the distances with the corresponding torsions, it is found that the same law

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holds as in the case of repulsion. The experiment, however, is difficult, and is only possible when the balls are very feebly electrified. To prevent the contact of the two balls, Coulomb fixed a silk thread in the instrument, so as to stop the course of the movable ball.

We may assume as evident, that when an electrified ball is placed in contact with a precisely equal and similar ball, the charge will be divided equally between them, so that the first will retain only half the charge which it had before contact.

Suppose that an observation on repulsion had just been made with the torsion-balance, and that we touch the fixed ball with another exactly equal insulated ball, which we then remove, it will be found that the amount of torsion requisite for keeping the movable ball in its observed position is just half what it was before. The same result will be obtained by touching the movable ball with a ball of its own size. We conclude that, if the charge of either body be altered, the attractive or repulsive force between the bodies at given distance will be altered in the same ratio. The law is not rigorously true for bodies of finite size, unless the distribution of the electricity on the two bodies remains unchanged. When the two bodies are very small in all their dimensions in comparison with the distance between them, their mutual force is represented by the expression

$$\frac{qq'}{D^2},$$

q and q' denoting their charges, and D the distance. If this expression has the positive sign, the force is repulsive, if negative, attractive.

GIRDLING THE EARTH WITH WIRE.

With the exception of direct lines from the western coast of America to Asia, the girdle which good-humored Puck was to put about the earth seems to have been completed—the forty minutes the little sprite claimed to accomplish his work has been quite verified by the events and the labor of the present age. The wires of the telegraph are annihilating distance, aiding the laws, and bringing the nations of the earth into a companionship which compels a better understanding. When we can read in the morning papers the Australian news of yesterday, coming by way of London, leaving there at 3 A.M. of to-day, the triumph of science and the testimony of success to energy and perseverence is complete. North, East, South, and West—all are within a few hours' reach with the touch of the instruments, and the steady tapping of the telegraphic signal breathes the wishes of the world and the news of national or financial import with unerring promptness. The slender girdle which the wires spread makes all mankind close neighbors, and the bond of union which civilization is each day riveting should make us truer friends, and nobler toward each other.—*New York Commercial Advertiser.*

SIGNAL SERVICE BY PROFESSOR TYNDALL.

A press dispatch, dated at Washington, says:

At the request of the Chief Signal Officer of the Army, Professor Tyndall, now in Europe, has consented to superintend the device and construction of an electrical instrument to be used at the signal stations of the army, for making regular, simultaneous observations of the electrical condition of the atmosphere. It is hoped from the immense rapidity with which electric changes manifest themselves, a system of electric observations of approaching storms, far in advance of any hitherto had, may be established.

ON THE ELECTRICAL PROPERTIES OF CLOUDS AND THE PHENOMENA OF THUNDER STORMS.

By Professor Osborne Reynolds, M. A.

The object of this paper is to point out the three following propositions respecting the behaviour of clouds under conditions of electrical induction, and to suggest an explanation of thunder storms based on these propositions, and on the assumption that the *sun is in the condition of a body charged with negative electricity.*

1. A cloud floating in *dry* air, forms an insulated electrical conductor.

2. When such a cloud is *first* formed, it will not be charged with electricity, but will be ready to receive a charge from any excited body to which it is near enough.

3. When a cloud charged with electricity is *diminished* by evaporation, the tension of its charge will increase until it finds relief.

I do not imagine that the truth of these propositions will be questioned, but rather that they will be treated as self-evident. However, as a matter of interest, I have made some experiments to prove their truth, in which I have been more or less successful.

Experiment 1, was to show that a cloud in dry air acts the part of an insulated conductor. The steam from a vessel of hot water was allowed to rise past a conductor, the apparatus being in front of a large fire, so that the air was very dry. When the conductor was charged, the column of vapor was deflected from the vertical to the conductor, both for a positive and negative charge.

Experiment 2, was made with the same object as experiment 1. A gold leaf electrometer was charged so that the leaves stood open, and then a cloud made to pass by the insulated leaves. As the cloud passed they were both attracted. This experiment was attended with considerable difficulty, as the moisture from the steam seemed to get on the glass shade over the gold leaves, and so form a charged conductor between the leaves and cloud. The cloud was first formed by a jet of steam from a pipe, then by the vapor from a vessel of boiling water, and lastly, by a smoke ring, or rather a steam ring. By this latter method, an *insulated* cloud was formed, which, as it passed, was attracted by the charged leaf.

Of the two latter propositions, I have not been able to obtain any experimental proof. I made an attempt, but failed through the bursting of a vessel in which the cloud was to be formed. I hope, however, shortly to be able to renew the attempt, and in the meantime, I will take it for granted, that these propositions are true. Faraday maintained that evaporation was not attended by electrical separation, unless the vapor was driven against some solid, when the friction of the particles of water give rise to electricity. So that unless there were some free electricity in the steam or vapor before it was condensed, none could be produced by the condensation, and hence the cloud when formed would be uncharged.

In the same way with regard to evaporation, unless, as is very improbable, the steam into which the water is turned, retains the electricity which was previously in the condensed vapor; the electricity from that part of the cloud which evaporates must be left to increase the tension of the remainder. So that, as a charged cloud is diminished by evaporation, the tension of the charge will increase, although the charge remains the same.

I will now point out what I think to be the bearing which these propositions have on the explanation of thunder storms. In doing this, I am met with a great difficulty, namely: ignorance of what actually goes on in a thunder storm. We seem to have no knowledge of any laws relating to these every-day phenomena; in fact we are where Franklin left us—we know that lightning is electricity, and that is all.

It is not, I think, decided whether the storm is incidental on the electrical disturbance or *vice versa*, *i. e.*, whether the electricity causes the clouds and storm, or is a mere attendant on them. Nor can I ascertain that there is any certain information as to whether, when the discharge is between the earth and the clouds, the clouds are positive and the earth negative, or *vice versa*. Such information as I can get, appears to point out the following law: that in the case of a fresh-formed storm, the cloud is negative and the earth positive; whereas, in other cases, the cloud is positive and the earth negative.

Again, thunder storms move without wind, or independently of wind; but I am not aware that any law connecting this motion with the time of day, etc., has ever been observed, though it seems natural, that however complicated by wind and other circumstance, some such law must exist. In this state of ignorance of what the phenomena of thunder really are, it is no good attempting to explain them. What I shall do, therefore, is to show how the inductive action of the *Sun* would necessarily cause certain clouds to be thunder clouds in a manner closely resembling, and for all we know, identical with, actual thunder storms.

In doing this, I assume that the thunder is only an attendant on the storm, and not the cause of it; and that many of the phenomena, such as forked and sheet lightning, are the results of different states of dampness of the air, and different densities in the clouds, and really indicate nothing as to the cause of electricity. In the same way, the periodicity of the storms, is referred to the periodical recurrence of certain states of dryness of the atmosphere. Thus, the fact that there is no thunder in winter, is assumed to be owing to the dampness of the air, which allows the electricity to pass from and to the clouds quietly. What I wish to do, is to explain the cause of a cloud being at certain times, in a different state of electric excitation to the earth and other clouds, and of this difference being sometimes on the positive side and sometimes on the negative, that is to say, why a cloud should sometimes appear to us on the earth to be positively charged, sometimes negatively, and at others not to be charged at all.

The assumed condition of the sun and earth may be represented by two conductors S and E, acting on one another by induction, the sun being negative and the earth positive. The distance between these bodies is so great that the inductive action would not be confined to those parts which are opposed, but would in a greater or less degree extend all over their surfaces, though it would still be greater on that side of E, which is opposite to S, than on the other side.

The conductor E must be surrounded by an imperfectly insulating medium to represent damp air. The formation of a cloud may then be represented by the introduction of a conductor C near to the surface of E. Such a conductor at first having no charge, would attract the positive electricity in E, and appear by reference to E to be negatively charged. If it was near enough to E, a spark would at once pass, which would represent a flash of forked lightning. If it were not near enough for this, it would obtain a charge through the imperfect insulation of the medium. Such a charge might pass quietly, or by the electric brush. When the cloud had obtained a charge, it would not exert any influence on the earth, unless it altered its position. But if the heat of the sun caused part of the cloud to

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evaporate, the remainder would be surcharged and appear positive. Or if C approached E, then C would be overcharged, and a part of its electricity would return, and on its return it might cause positive lightning. Thus, suppose that after a cloud had obtained its charge, part of it came down suddenly in the form of rain. As the rain came lower its electric tension would increase, until it got near enough the ground to relieve itself with a flash of lightning, almost immediately after which the first rain would reach the ground. It has often been noticed that something like this often takes place; it often begins to pour immediately after a flash of lightning, so much so that it seems that the electricity had been holding the rain up, and it was only after the discharge that it could fall. This, however, cannot be the case, for the rain often follows so quickly after the flash, that there would not have been time for it to fall from the cloud unless it had started before the discharge took place. If, on the other hand, C receded from E, it would again be in a position to accept more electricity, or would again become negative. In this way, a cloud in forming, or when first formed, would appear negatively charged; soon after it would become neutral, and then if it moved to and from the earth, it would appear positively or negatively charged.

If the air was very dry, as it is in the summer, any exchange of electricity between the earth and the cloud would cause forked lightning, in the winter it would take place quietly, by the conduction of the moist atmosphere.

In this way, then, there would sometimes be positive, sometimes negative lightning; sometimes the discharge would be a forked flash or spark, sometimes a brush or sheet lightning. And if clouds are formed in several layers, as would be represented by another conductor, D, outside C, then, in addition to the phenomena already mentioned, similar phenomena would take place between C and D; and if, in addition to this, we were to assume that there are other clouds in the neighborhood, the phenomena might be complicated to any extent.

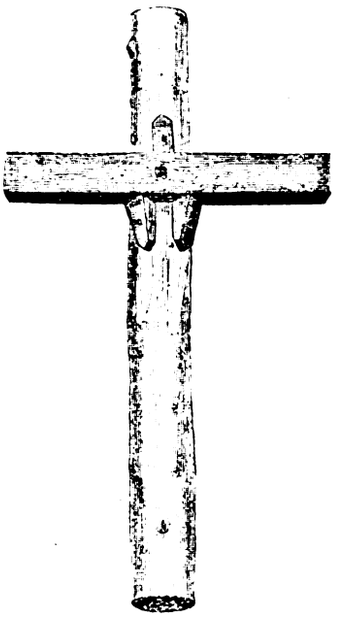
And if, further, the motion of the sun is taken into account; as the conductor S moves round E the charges in D and E would vary, accordingly as they were more or less between S and E and directly under the induction of S; *i.e.*, the charge in a cloud would appear to change owing to the motion of the sun; thus, a cloud would appear to change owing to the motion of the sun; thus, a cloud that appeared neutral at mid-day would, if it did not receive or give off any electricity, become changed positively in the evening.

With regard to the independent motion of the clouds, there are several causes which would effect it. For instance, a cloud, whether it appeared on the earth to be negatively or positively charged, would always tend to follow the sun, though it is possible this tendency might be very slight. Again, one cloud would attract or repel another, according as they were charged with the opposite or the same electricities; and in the same way a cloud would be attracted or repelled by a hill, according to the nature of their respective charges.

Such, then, would be some of the more apparent phenomena under the assumed conditions. So far as I can see, they agree well with the general appearance of what actually takes place, but, as I have previously said, the laws relating to thunder storms are not sufficiently known to warrant me in doing more than suggesting this as a probable explanation.

In these remarks I have said nothing whatever about what is called atmospheric electricity, or the apparent increase of positive tenison as we proceed away from the surface of the earth. I do not think that this has much to do with thunder storms. If the law is established, it seems to me that it will require some explanation, besides merely that of the solar induction acting through the earth's atmosphere on to the surface of the earth. It would rather imply that the sun acts on some electricity in the higher regions of the earth's atmosphere, and that electricity in these regions acts again on the surface of the earth; but, however this may be, the effect of the assumptions described in this paper would be much the same.

HOW TO ATTACH CROSS-ARMS TO STANDING POLES.



The above cut illustrates a new device for fastening cross-arms to poles, without notching them. The plan consists in flattening or blazing the side of the pole with a hatchet or draw-knife, bolting on the cross-arm, and then nailing two short oak brackets below the cross-arm, flaring outward, and one above directly over the bolt.

This plan makes a stronger support than any notch or gain, retains full strength of pole, costs less than notching, and its only apparent objection seems to be in the question of looks; but as we usually learn to like the looks of a thing which serves a good purpose we may come in time to regard this, if not actually handsome, not altogether ugly. The nail holes are bored on a slant, so as to draw the blocks so firmly against the cross-arm that it cannot wiggle.

The idea was suggested by the recent order concerning the use of cross-arms in place of brackets. That order, by the way, did not correctly convey the meaning intended, which was the following: Wherever there are two wires on brackets, or bracket and pin, and a third is to be added, a cross-arm must be used, and one of the two transferred to it. In cases where there are three wires on brackets, it is ordered that two of them shall be transferred to a cross-arm as fast as the work can be done without neglecting regular construction. The change should be made first upon the most important lines and those most likely to have other wires added.

This plan is to be adopted for all work where the standing poles are too small to bear cutting, and is authorized in other cases, as may be deemed desirable, by the Superintendents.

AN ELECTRICAL TOWER.

Mr. William H. Ward, of Auburn, N. Y., has suggested an electrical tower for accumulating natural electricity for telegraphic purposes. The structure, which is to be placed on high mountain peaks or other elevated stations, is to be made in three sections. The lower portion is a mere shell, containing a door; above this, and insulated from it by a diaphragm, is the middle part, in which are openings or windows having slats pivoted in them, so that, by means of raising or lowering rods suitably connected to such shutters, the openings may be shut or opened. A projecting roof extends over the windows, serving to protect them from the weather, and also for receiving the aerial electricity which may be drawn from it by wires for land line purposes. Above this roof is another insulating diaphragm: The highest portion of the tower is surmounted by a bent ventilating tube and vane, so arranged and connected with the rods acting upon the shutters, that the revolution of the vane by the wind will open the windward and close the leeward slats; the wind, therefore, assists in driving an aerial current of electricity into the insulated middle portion of the tower, which current passes upwardly through the upper portion of the tower and out through the ventilator, thus forming a draft by means of which the electrical current is forced out at the vane. Insulated wires, leading from the top portion of the tower, allow a supply of electricity to be drawn therefrom.

By the use of the aerial electricity which surrounds the earth in the upper strata of the atmosphere, the inventor considers that artificial batteries may be entirely dispensed with, and a circuit formed merely by connecting the aerial current with the earth current. For instance, to bring Buenos Ayres, in South America, in direct connection with New York, the following plan would be pursued: One electrical tower is erected on Pike's Peak, or any other suitable high mountain in North America, and another similar tower on some suitable peak of the Andes, in South America. The former would, by means of land lines, be connected directly with Denver, which place is again connected with all the prominent cities of the States. In a similar manner the southern tower is connected by land lines with prominent cities *via* Quito. New York telegraphs to the tower on Pike's Peak, and the operator, having connected the land lines with the aerial current, the signals are transmitted through the aerial current to the town in South America, and thence—the land lines being suitably connected—to Quito and Buenos Ayres.—*Scientific American.*

A SUGGESTION TO TELEGRAPH CONSTRUCTORS.

A writer in the *Western Rural* says: "Take boiled linseed oil and stir in pulverized charcoal to the consistency of paint. Put a coat of this over the timber, and there is not a man who will live long enough to see it rotten. I discovered many years ago that wood could be made to last longer than iron in the ground, but thought the process so simple and inexpensive that it was not worth while making any stir about it. I have taken out basswood posts, after having been set seven years, that were as sound as when first put into the ground. Time and weather seemed to have no effect on them. The posts can be prepared for less than two cents apiece." They should be well seasoned before the oil and charcoal are applied.

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CORRESPONDENCE.

PROPOSITION TO CHANGE THE ALPHABET.

To the Editor of the Journal of the Telegraph :

I think statistics will sustain my statement, that three-fourths of our "bulls" arise from our spaced letters. The fact has been known to some extent for years, but efforts to change it, being spasmodic and not general, have uniformly resulted in failure.

Now that nearly all lines in the country are in the hands of one corporation, it will be easy to make the change.

The European Morse Alphabet, although in the aggregate longer than ours, is written as rapidly, as there are no spaced letters to be drawn out longer. As it is a combination of dots and short dashes, it can be read much faster than ours.

My idea of changing would be this: Notify all offices by circular, that after the first day of January, 1874, the European Alphabet—or some modification cutting out our present spaced letters and *l*, would be used only on the Company's lines—that all operators not using it at that date would be assessed ten per cent. on their salaries, until they were competent to use it. Long before that time, it would be in common use.

It is really a trifling matter to adopt the new one; all operators could learn it in a few days, and write it in two weeks. It only requires that the order be given and enforced. The opposition companies should be invited to join in the movement, and then operators would learn at once, for obvious reasons.

I have not conversed very generally with telegraphers about this, but those to whom I have explained it endorse it heartily. H.

APPRECIATION.

PORT HASTINGS, C. B., Feb. 12, 1873.

To the Editor of the Journal of the Telegraph :

As one who has served a long time in the telegraph ranks, and who has from the start labored, not merely to keep pace with, but to be in advance of, the requirements of the service, I trust it will not be out of place for me to express my gratification at the constant improvement in your paper, and to bid you "God Speed" in your good work. Such sources of information were not open to us in the early days of my telegraphic life. I well remember how much they were needed, and heartily congratulate my younger brethren on their superior advantages. The knowledge *we* have had to *work* for, is ready-made to their hands.

I have always had access to the JOURNAL, but as it is now, I must have a copy of *my own*.

JAS. C. UPHAM.

ALPENA, Mich, Feb. 26th, 1873.

To the Editor of the Journal of the Telegraph :

An attorney leaves a message for transmission signed by another party, for whom he is doing business, and directs answer to be delivered to him, or at his office. Should it be so delivered; or to party addressed?

Answer.—Rule 52 reads: "All messages must be promptly delivered to the parties addressed, or, in their absence, to their agents, clerks, or some member of their family, and a receipt taken for the same."

It does not appear that this attorney is an "agent" within the meaning of the rule, therefore the message in answer should not be delivered to him, unless directions in writing are given to that effect, by the party signing the original message

UPON THE IMPERFECTIONS OF OUR ALPHABET.—A CHANGE RECOMMENDED.

To the Editor of the Journal of the Telegraph :

There are perhaps a great number of our telegraphic brethren who will honestly differ with the writer in their opinion of the subject which is here put before them.

It is assumed, at the outset, that the spaced letters of the Morse Alphabet constitute in it a great point of weakness, and upon this ground we have seen in the past, several propositions for the substitution either of another alphabet, or of other combinations for the spaced letters. The Bain alphabet was once considerably in favor; and an alphabet arranged by H. M. Schieffelin, Esq., was for a time in partial use between Boston and New York, upon the lines of which he was President.

The proposition, now again agitated, is a change of alphabet; and it is well to consider what should be adopted.

In Europe and the East, the general system of rules and regulations is determined by a Congress. It will suggest itself to every one that a great and desirable good would come out of such a gathering, and that is *uniformity as to the methods of dealing with the business.* As a matter of course a uniform alphabet has been adopted.

The Telegraphic field is greatly enlarging. but American operators are confined, by their alphabet, to American soil. The time is near when Americans will be desirous of taking hold of Cable Circuits, or of lines in other countries. The alphabet now used in Europe is used in every quarter of the globe with the exception of America. On the Atlantic cables; in Great Britain and Ireland; throughout the European continent, and through Asia and Africa, and also on the cable routes to the East, from Falmouth *via* Lisbon and Gibraltar, through the Mediterranean and the Red Sea to India, China and Japan; on the lines to and in Java and Australia; on the West India and South American cables. In fact everywhere but in America, there is a uniform alphabet.

It would be wise for American authorities, and advantageous to employees, to secure the adoption of an alphabet uniform with other nations. The American Morse Alphabet is defective, as before indicated. Besides, its range does not cover the accented letters of the French and German languages, which in International business are often employed.

Whether to amend our present alphabet and send representatives abroad to interview the *Crowned heads* on the topic of its adoption in their realms, or whether we shall gracefully fall in and adopt their alphabet; or still again, whether we shall convoke a Congress of all nations, on a motion to make something entirely new, is the question now before us.

As our alphabet, in its present shape cannot be adopted, it follows that *we* must change. Since we are looking to the good of the *whole* and trying to take an enlarged view of the matter, it seems best to make as little disturbance as possible.

The European alphabet is altogether the most extensively used. It is adapted to both land and sea lines. It can be used on the Morse, on the Mirror, on double and single needles or bells. It is arranged scientifically, and meets what is needed in a uniform alphabet. Shall we not put aside our prejudices and with one voice show our willingness to adopt it?

H. H. W.

BINGHAMTON, N. Y., March 8, 1873.

To the Editor of the Journal of the Telegraph :

Are Telegraph Companies compelled by law to deliver messages to any point within city limits (without regard to distance) free of charge?

S. H. G.

Answer.—No.

To the Editor of the Journal of the Telegraph :

A man came into our office, wrote a message which contained a falsehood, and paid for its transmission. Being acquainted with the man, and knowing that the sending of such a message would injure him, as every lie will sooner or later, I went to him and persuaded him to let me tear it up, which was done, before it was transmitted. My manager now makes me pay for it, on the ground that the Company loses by my interfering with the sending of the message.

What is your opinion of the case? Cannot the Company well afford to do without such business?

OPERATOR.

Answer.—You were wrong in interfering. The Company cannot assume to judge as to the proper reading or the morality of messages offered for transmission. It can only be required that messages shall be couched in language free from profane or indecent expressions.

To the Editor of the Journal of the Telegraph :

If message comes collect half-rate, and in meantime, party comes in and asks if anything for him; should I deliver message and charge full rate?

Answer.—Yes, if it is requested. You should not offer to do so, however.

MIAMI, Mo., Feb. 27, 1873.

To the Editor of the Journal of the Telegraph :

I received the following message for transmission: "Ship to-night on No. twelve, three cars hogs, one of cattle."

Receiving operator refused to take the message, and insisted that I must spell "No." in full (Number). Was he right in refusing to receive the message as it was written? W. H. S.

Answer.—The receiving operator should have taken the message as it was sent to him. The refusal to receive it, unless it be made to conform to his ideas of what was proper, cannot be justified. The matter should be referred to your Superintendent, in order that he may put in force measures to prevent a recurrence of such evident stupidity. Rule 24 provides that "messages must be sent as they are written." Rule 20 contains a clause to the effect that "no office shall refuse to receive and forward or deliver any message from any other office unless it should endanger life or property."

To the Editor of the Journal of the Telegraph :

Suppose that the body of a paid message, in passing over this line, should be given to an editor by an operator in a repeating office, and published in a newspaper on account of the bad spelling and ludicrous character of the message. Would it not be a violation of Rule 102 of the Book of Regulations?

Is there any rule that allows a repeating office to publish private dispatches, if they happen to be *funny?* ***

Answer.—Such a proceeding is a violation of the rules. There is no rule which allows the publication, by any office, of the contents of any message, whether funny or otherwise.

JACK.—Any superintendent can inform you of the range of salaries in his district for good operators. First-class operators are always in demand.

F. P. D.—The reduction of rates to $2.50, applies only to offices upon the Western Union lines. Tariffs for "other lines" remain unchanged.

W. X. C.—An operator capable of receiving between twenty-five and thirty words per minute, by sound, may be deemed to possess fair ability, and could probably fill, with acceptance, a position in any office in New Jersey.

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FOREIGN TELEGRAPHIC ITEMS

THE BRAZILIAN CABLE.

An important undertaking, entitled the Brazilian Submarine Telegraph Company (Limited), has been introduced under influential auspices, to establish under exclusive concessions for twenty years from the Emperor of Brazil and the King of Portugal, telegraphic communication with Brazil and the adjacent republics of South America. The capital is £1,300,000, in shares of £10 each. The concessions now held by the contractors will be vested in the undertaking. At Lisbon a junction will be formed with the system of the Eastern Telegraph Company, which is about to lay a duplicate cable from Lisbon to Falmouth, thereby ensuring a rapid transmission of this company's messages to and from England. The Brazilian concession includes the right to lay cables along the coast of Brazil, subject to a previous concession also held by the contractors. This company have entered into negotiations with the Great Western Telegraph Company (Limited), for that company to lay lines, under the powers referred to, along the whole coast from Para to Rio Grande do Sol, a distance of about 4,000 miles. That company has already over 2,000 miles of cable manufactured, and the shareholders have authorized their directors to negotiate for undertaking that line. The Brazilian Submarine Telegraph Company is prepared to enter into a working agreement with the Great Western Company, including an exchange of gross revenue to the extent of one-third, subject to such a complete coast system being established, failing which, the Brazilian Government will construct an efficient system of land lines Buenos Ayres is already connected by cable with Monte Video, and the Monte Videan Government has granted concessions for cable connection with Brazil, so that the important international traffic of the River Plate is also expected to accrue to this concern from the time of opening the line. A land line from the Argentine Confederation to Chili is, moreover, in working order, and will be another feeder. The cables will be laid in three sections—the first from Lisbon to Maderia, 633 miles in length, in July next; the second from Maderia to St. Vincent, 1,260 miles, in September, and the third from St. Vincent to Pernambuco, 1,953 miles, in May, 1874. The cables will be of the best construction, with improvements on the types of the Atlantic cables, and the contractors propose employing the Great Eastern in laying the deep-sea portion of the line. The contract price for making and laying the cable is £1,280,000, of which £880,000 is payable in cash, and £400,000 in fully paid-up shares.

RIVER PLATE AND BRAZIL TELEGRAPH.

This enterprise is the fitting complement of the Brazilian cable project, which was brought before the public last week, and was received with such marked favor, it being intended to continue that line of communication from Rio de Janeiro, the terminus of the cable, to the cities of Monte Video and Buenos Ayres, and the Argentine and Uruguayan States. The company for this purpose was formed some time since in Rio de Janeiro, under influential auspices, and one half of the capital of £400,000 at once subscribed there, the remaining £200,000 was being now offered for public subscription. The company has secured the exclusive privilege from the Imperial Government of Brazil, for a period of forty years, of laying a sub-marine cable between the points named; while concessions have also been granted to the same effect by the Government of the Republic of Uruguay for a similar period, and by the Argentine Republic in perpetuity, with further authorization of the construction and working of a system of land-lines throughout that Republic, which will afford communication with Valparaiso and the important districts in Chili. The lines in Uruguay and Brazil, under the concession, revert to the Government at the end of the term of years, and their cost will thus be provided for by a reserve fund of 10 per cent. An agreement has been entered into upon equitable rating terms, for the amalgamation of the Montevidian and Brazilian cable with the company's system, which will thus consist of 1,400 miles of sub-marine cable, and 710 miles of land-lines. Contracts have been made for the construction of the cable, under the superintendence of Sir William Thomson and Professor Jenkin, with Messrs Siemens Brothers, who have engaged to lay the same by the 15th August next. The land lines are now under construction. The report estimates the net earnings of the system of lines at upwards of 23 per cent. on the outlay. There can be no doubt that the line forming the sole cable communication between Rio de Janeiro, Buenos Ayres, and Monte Video, and connecting the latter towns and the important towns on the Western coast of South America with Europe, by means of the Brazilian cable, is admirably situated for a large and increasing business.

THE report of Hooper's Telegraph Company (Limited), to be submitted to the meeting on the 20th instant, shows a profit for the year of £69,177, leaving, after deducting the proportion due to Mr. Hooper, £41,950, for apportionments; of this 7s. per share was distributed in July last, and a further dividend of 13s. 6d. in cash is shortly to be paid, and a bonus is to be appropriated of 542 fully paid-up shares of £20 each, of the Great Western Telegraph Company (Limited). The dividends and shares to be placed in trust represents a total distribution for the year of rather over 17 per cent., free of income tax.

A PROSPECTUS of the Direct Spanish Telegraph Company (Limited), has been issued, with a capital of £130,000, in 13,000 shares of £10 each, to acquire and work a submarine cable already laid between Spain and Great Britain. This cable, having been tested, was opened for traffic on the 31st of December last, and has since been working uninterruptedly; the price required for the cable, its land connection at Bilbao and the Lizard, instruments, and all appliances for working, is £112,000. All concessions and grants, private or official, will also be transferred to the Company without further payment.

THE Atlantic Telegraph Company are about to permit the astronomers of various countries to transmit their observations through their cable free of charge, the transmission by post having long been regarded as injurious (through the length of time which elapsed) to the interest of science.

THE proposal for a working agreement between the China Submarine and the Great Northern Telegraph Companies has been carried out. By its provision, the tariff, for messages of 20 words to and from China and Japan, is fixed at £6. When interruptions arise the company, upon whose line they occur will cease to participate in the receipts until such time as communication is restored. The agreement is to remain in force for three years, and will come into operation immediately upon the Russian Government intimating its consent to the tariff being fixed at £6. Every exertion would be made to guard against any interruptions in the service, and thus to afford that thoroughly reliable communication which is so important to the interests of the mercantile community of China; and, if it should be found necessary, as a means towards carrying out this end, a duplicate cable would be laid between Hong Kong and Shanghai. It was urged that steps should be taken to insure the speedy completion of the extension which will connect the coast ports, Amoy, Foochow, &c., with the main line.

THE London *Times* says that the recent transmission of the Queen's speech throughout England evidenced some very rapid telegraphing. The document contained 858 words, and reached York, a distance of about 200 miles, in six minutes and a half. Wheatstone's automatic instruments were used. The above is at the speed of 132 words per minute.

MIDDLESBOROUGH EXCHANGE, with its numerous iron offices, is being run into from every direction with private telegraph wires. Messrs. Sanderson & Proctor, of Huddersfield, are erecting one line of these for the Lackenby Iron Company, and another for the North Yorkshire Iron Company, to communicate between works and head offices. The same firm is also introducing into the offices of Bolckow, Vaughan & Co., and others, a system of electric signals. By this means electric bells may be made to sound in all the workshops simultaneously, for leaving off and resuming work. If all adopted this plan it would be a great improvement on the buzzers, which make about the most discordant noise it is possible to make with sound.

A CIRCULAR issued recently by the West India & Panama Telegraph Company (limited), indicates that the directors have, for some time past, been striving to effect an arrangement for completing their system of cables, which they hope will soon be sufficiently matured for communication to the shareholders.

THE Brazilian Government are about to take the initiative in an important measure for the protection of cable property, having, under the concession for the Brazilian Submarine Telegraph, engaged to cause the neutrality of the cable to be guaranteed by international agreements.

THE steamer La Plata having successfully relaid the cable between the Orkney Islands and the main land, has proceeded to Shetland to repair the cable there, and upon her return will relay the former cable in the Pentland Firth.

IT is officially announced that the average time taken in transmitting messages from any postal telegraph station in the United Kingdom to Bilbao, in Spain, by the Direct Spanish Telegraph Company's cable, is one hour and twenty-nine minutes, and that the earnings accruing to the company during the last ten days have amounted to £329 3s. 6d.

THE following is a statement showing the total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ending the 8th of February, 1873, and during the corresponding week of 1872:—Total number of messages for the week ending February 8, 1873, 293,990; corresponding week last year, 250,776; increase in the week of 1873 on that of 1872, 43,214.

THE following statement shows the total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ended February 15, 1873, and during the corresponding week of 1872:—February 15, 1873, 292,447; February 17, 1872, 240,694, showing an increase in the week of 1873, on that of 1872, of 51,753.

THERE are now 55,015 miles of telegraph wires in Chile.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
March 15, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Hereafter all messages for Union Springs, Ala., must be pre-paid Tariff for other lines, 135 and 8. Half-rate messages will no longer be received from, or taken for, that office.

The "tariff for other Lines" to Fernandina and Gainesville, Fla., will hereafter be 100 and 10 from Lake City, Fla.

Jonesboro, Ga., closed.

Shawhan, Ky., closed.

Lincolnville, Me., re-opened.

Brady, Mich., changed to Vicksburg, Mich.

Chippewa, Mich., changed to Lake, Mich.

Leslie, Mich., closed.

The office at 128 Crawford's Quarry, Mich., is in Presque Isle Co.

Horseheads, N. Y., is now a W. U. office, and should be checked direct, square 83.

The P. O. address of Skaneateles Junction, N. Y., is Hartlot, Onondaga Co.

Houston, O., closed.

Siverleyville, Pa., closed.

Stand-off City, Pa., closed.

Birdsboro, Pa., closed.

The office at Bingen, Pa., will hereafter be checked direct, square 59.

The P. O. address of Bethel, Tenn., is Bethel Springs, McNairy Co.

Stewart's Station, Tenn., closed.

Fortress Monroe, Va., closed. Business will be mailed from Norfolk, Va., check Norfolk.

Business for the Navy Yard, Portsmouth, Va., should be sent and checked to Portsmouth, Va.

Oconomowoc, Wis., is now an other line office, tariff for other lines 35 and 2 from Chicago, Ill.

NEW OFFICES.

557 Floyd's Hill, Col.
67 Ashland, Del.
* Bronson, Fla., 150 15 198 Lake City, Fla.
* Cedar Keys, Fla., 175 15 198 " "
* Starke, Fla., 100 10 198 " "
307 Deerfield, Ill.
297 Libertyville, Ill.
307 Morton, Cook Co., Ill.
297 Wadsworth, Ill.
347 Wesley City, Ill.
281 Augusta, Ind.
261 Etna Green, Ind.
289 Oxford, Benton Co., Ind.
454 Vail, Iowa.
535 Sargent, Kansas.
85 Ashland, Md.
60 Goldsborough, Md.
21 Littleton, Mass.
240 Bellevue, Mich.
100 Crawford, Crawford Co., Mich.
138 Lake, Mich.
240 Olivet, Mich.
240 Potterville, Mich.
138 St. Helens, Mich.
251 Vicksburg, Mich.
148 Wells, Mich.
138 West Branch, Mich.
516 Hastings, Neb.
47 Stockton, N. J.
83 Caroline, N. Y.
120 Evans, N. Y.
40 Mellenville, N. Y.
101 Perry, N. Y.
122 Buffalo Mills, Pa.
122 Mann's Choice, Pa.
112 Mt. Dallas, Pa.
122 Preston, Pa.
122 State Line, Bedford Co., Pa.
156 Bamberg, S. C.
186 St. Stephens, S. C.
*Clarksville, Red River Co., Tex., 65 4 470 Marshall, Tex.
*DeKalb, Tex., 65 4 470 Marshall, Tex.
*Paris, Tex., 75 5 470 Marshall, Tex.
302 Pleasant Grove, Tenn.
297 Oakwood, Wis.
297 Truesdell, Wis.
297 Western Union Junction, Wis.

Half Rate messages may be taken for and received from Clarksville, DeKalb and Paris, Tex.

The tariff to square 100 is 30 cents more than tariff to square 230.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
New York, March 10th, 1873.

TO ALL TRANSFER OFFICES.

Complaint has been made that Section 5 of Instructions to Managers is not fully complied with; that in many instances the address of the payee of money transfers is insufficient or entirely omitted, and that much unnecessary correspondence and consequent delay is thereby entailed.

Managers should give particular attention to this point and see that a proper address, or explanation of its omission as hereinafter directed, accompanies each transfer order.

In cases where the sender is unable to give the precise address of the payee, but expects him to call for the money at the paying office, without notice therefrom, the words "*will call*" should precede the name of the paying office and be counted as part of the message, for example:

Pay JOHN SMITH, will call, NEW YORK.

In cases where the transfer is sent in response to a message from the paying office, no address will be required, but the words "*asking transfer*" should precede the name of the paying office, and be counted as part of the message, for example:

Pay JOHN SMITH, asking transfer, NEW YORK.

GOLD TRANSFERS.

When a transfer is received, *payable in gold*, and the manager of the paying office has no coin on hand, he will purchase the amount required and credit himself with the premium paid for same, in his monthly account current under the heading of "Premium on Gold." When no gold can be obtained, the manager will tender its equivalent in currency to the payee, ascertaining same by reference to his transfer agent, who will advise him of the current rate of the day.

Transfer agents will report in their weekly statements, under the heading of "Premium on Gold" the amount expended or allowed by their offices for premiums on gold transfers.

GEO. H. MUMFORD,
Vice-President.

EXECUTIVE OFFICE,
NEW YORK, March 12th, 1873.

On and after March 24th, money order offices will be established at the following named points:

In D. H. Bates' District.—Catawissa, Pa.; Lewisburg, Pa.; Milton, Pa.; Muncy, Pa.

In R. C. Clowry's District.—Denison, Texas.

G. H. MUMFORD,
Vice-President.

EXECUTIVE ORDER No. 145.

NEW YORK, February 27th, 1873.

The complimentary franks of 1872 are hereby continued in force until the first day of April. After that date they will no longer be received, and no stamps, except those for this year, will be valid.

GEO. H. MUMFORD,
Vice-Pres't.

PROJECT FOR A NEW CABLE BETWEEN ENGLAND AND AMERICA.

The prospectus of the company which has organized to lay a cable from Plymouth, England, to Rye Beach, N. H., has been published in London. All the money necessary for carrying out the project has been secured, and contracts for the construction of the cable have been concluded. The company is forbidden by its articles of agreement from amalgamating with any like enterprise.

THE transfer books of the New York, Newfoundland and London Telegraph Company will be closed in this city on the 31st inst., and removed to London and reopened on April 15.

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKNOWLEDGEMENT OF RECEIPTS FOR ASSESSMENTS 37 & 38 TO MARCH 11th.

The acknowledgement of receipt of any assessment is to be understood as an acknowledgement for all previous assessments.

8	19	22	27	29	30	33	41	51	55	65
69	70	78	80	83	84	89	97	99	100	107
111	114	117	120	126	131	176	177	179	185	186
187	189	190	191	193	197	198	200	201	202	206
215	217	230	237	238	239	240	242	246	252	258
267	277	294	344	347	353	381	388	398	425	434
451	453	455	457	466	468	469	470	471	474	475
482	484	511	512	514	515	566	575	576	584	590
594	602	605	615	636	646	648	661	676	694	695
697	700	705	711	712	717	722	729	766	772	773
778	790	804	808	813	822	851	856	875	901	904
905	911	922	931		1008	1028	1047	1054	1057	1071
1072	1080	1087	1100	1101	1102	1103	1105	1106	1107	1108
1110	1112	1113	1115	1117	1119	1120	1121	1122	1123	1125
1127	1130	1131	1134	1135	1136	1151	1152	1153	1154	1169
1191	1195	1198	1201	1205	1210	1222	1226	1227	1231	1240
1251	1257	1264	1273	1278	1279	1287	1288	1289	1290	1291
1323	1327	1360	1383	1395	1400		1412	1414	1415	1417
1418	1426	1439	1449	1450	1457	1458	1483	1486	1487	1488
1492	1502	1504	1505	1510	1528	1529	1530	1537	1539	1541
1542	1543	1545	1546	1549	1552	1556	1557	1562	1564	1569
1570	1597	1598	1599	1600	1601	1603	1604	1605	1606	1607
1608	1613	1617	1619	1620	1631	1639	1640	1641	1642	1643
1646	1647	1651	1653	1654	1655	1657	1669	1670	1671	1672
1681	1682	1683	1689	1690	1691	1692	1714	1715	1716	1722
1726	1727	1731	1734	1738	1739	1740	1741	1750	1751	1752
1753	1754	1755	1756	1757	1758	1759	1760	1761	1764	1768
1769	1770	1771	1772	1773	1774	1775	1776	1778	1779	1780
1786	1790	1792	1793	1798	1799	1800				

David Blackham of New York, certificate 1062, died February 28th, of consumption. His death, with that of Robert N. Norton, of Ironton, O., will necessitate another double assessment, which will be made in due time.

The subscription to the JOURNAL OF THE TELEGRAPH is $1.00 per year. It is no longer furnished to members at a reduced rate.

Mr. Perry Hood, Vincennes, Ind., E. Sholes, Dubuque, Iowa, Wm. DeBree, Louisville, Ky., have been appointed agents.

BORN.

GLASS.—At McLeod, Ky., March 4, 1873, to Frank Mt. Hope Glass, agent and operator, McLeod, a daughter.

MARRIED.

BLOXHAM—FIELDS.—On Monday evening, March 3d, 1873, by Rev. M. R. Wilkinson, Richard J. Bloxham, Operator W. U. Telegraph Office, Baltimore, Md., to Miss Eliza J. Fields.

STONE—ROUNDS.—On Wednesday evening, February 5th, by the Rev. J. S. Barger, Mr. Harry N. Stone, Manager of the Great Western Telegraph Office, Bloomington, Ill., and Miss Emily Estelle Rounds, all of Bloomington, Ill.

AN EXTENSIVE TELEGRAPHIC AND ELECTRICAL MANUFACTORY.

Siemens & Halske have extensive works for the manufacture of electrical and telegraphic apparatus in Berlin, St. Petersburgh, London, Vienna, Dresden, and Tiflis. The Berlin establishment alone employs 550 workmen. During the first six months of 1872 the following amount of apparatus was turned out from the Berlin works: 700 electro magnetic dial instruments; 1,750 magneto dials; 12,060 Morse ink writing recorders; 12,497 bell signals for railroads, and 231 Hughes type printers. The firm now consists of the brothers Ernest, William and Charles Siemens. In October last they celebrated their twenty-fifth anniversary, and set apart the sum of £8,000 or nearly $40,000, as a pension fund for their workmen.

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THE TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ORGANIZED IN 1867.

The heirs of deceased members receive one dollar from each of the surviving members of the Association.

All engaged in the Telegraphic service are eligible to membership, if in good health and of good character and habits. Initiation fee $1.50.

Blank forms of Application and Restoration may be had of the Secretary, or of any of the following Agents:—

Albany, N. Y.....Chas. C. King.
Augusta, Ga.,.....J. M. Crowley.
Atlanta, Ga.,.....J. Herrick.
Baltimore, Md.,.....Archd. Wilson.
Buffalo, N. Y.,.....J. W. Tillinghast.
Cincinnati, O.,.....F. A. Armstrong.
Charleston, S. C.,...J. D. Easterlin.
Chicago, Ill.,.....W. C. Long.
Cleveland, O.,.....H. L. Melton.
Clinton, Ia.,.....E. O. Wait.
Dubuque, Iowa,.....E. Sholes.
Erie, Pa.....G. W. Baxter.
Erie R'y Telegraph,...W. J. Holmes.
Harrisburg, Pa.,.....H. A. Clute.
Indianapolis, Ind.,....D. C. Hinsdale.
Louisville, Ky.,.....Wm. Debree.
Mobile, Ala.,.....Wm. Sandford.
Memphis, Tenn.,.....J. J. Fowler.
Milwaukee, Wis.,.....D. H. Henshaw.
New Orleans, La.,....Jas. T. Alleyn.
Nashville, Tenn.,.....E. C. Boyle.
Philadelphia,.....Jas. Merrihew.
Phillipsburg, N. J.,....John Fuller.
Pittsburg, Pa.,.....S. L. Gilson.
Peoria, Ills.,.....Charles W. Heaton.
Richmond, Va.,.....R. M. J. Paynter.
Syracuse, N. Y.,.....D. L. Pike.
St. Louis, Mo.,.....J. P. Cassiday.
San Francisco,.....J. S. Urquhart
Seattle, Wash. Ter.,...F. H. Lamb.
Springfield, Mass.,....W. J. Denver.
Springfield, Ills.,.....W. W. Kelchner.
Toronto, Ont.,.....A. Hunter.*
Vincennes, Ind.,.....Perry Hood.
Washington, D. C.,...M. Marean.
White River Junc., Vt.,G. W. Gates.

Additional Agents wtll be appointed as soon as practicable.

Applications for membership should be endorsed by the Agent through whom they are made.

Members in communicating with the Secretary will always state the Number of their Certificate.

A. S. BROWN, Treas.
D. R. DOWNER, Secy.

* A. Hunter is Agent for all of Canada.

AT the meeting of the Society of Telegraph Engineers, on the 13th ult., Mr. L. Clark read a communication from Mr. Willoughby Smith, the electrician of the Telegraph Construction and Maintenance Company, detailing a discovery he had made of the extreme sensibility of selenium to the influence of light during the passage of an electric current. If the bar of selenium placed in the dark have an electric current passed through it, and it be subjected to the influence of light, either daylight, or that of a lamp or candle, its power of conducting electricity is immediately doubled, and the effect ceases as soon as the light is withdrawn. Its effect is not at all diminished by the intervention of rock salt or colored glasses, and it is in no way due to the effect of heat. Mr. Clark pointed out the value this discovery would have in connection with photometric measurement.

OFFICERS OF THE WESTERN UNION TELEGRAPH COMPANY.

WILLIAM ORTON, *President.*

Alonzo B. Cornell,
Augustus Schell,
George H. Mumford,
N. Green,
} *Vice Presidents.*

George H. Mumford, *Secretary.* — R. H. Rochester, *Treasurer.*
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Anson Stager, *Gen'l Sup't Central Division, Chicago, Ill.*
Thomas T. Eckert, *Gen'l Sup't Eastern Division, New York.*
John Van Horne, *Gen'l Sup't Southern Division, Louisville, Ky.*
James Gamble, *Gen'l Sup't Pacific Division, San Francisco, Cal.*

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James S. Bedlow.....Portland, Me.
George W. Gates.....White River Junction, Vt.
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A. B. Chandler.....New York.
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2d District. J. B. Tree, Sup't, Louisville, Ky.; Geo. W. Trabue, Ass't Sup't, Nashville, Tenn.
3d District—J. A. Brenner, Sup't, Augusta, Ga.
4th District—C. G. Meriwether, Sup't, Mobile, Ala.
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6th District. L. C. Baker, Sup't, Little Rock, Ark.; Wm. A. L'Hommedieu, Ass't Sup't, Monroe, La.
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F. H. Lamb.....Seattle, W. T.
R. R. Haines.....Los Angelos, Cal.

Supply Department.

William Hunter, *Sup't and Gen'l Purchasing Agent, New York.*
A. H. Watson, *Storekeeper, New York.*
Thomas Orton. *Supply Agent, Chicago, Ill.*

Manufactories.

George M. Phelps.....New York.
W. H. Johnson.....Louisville, Ky

ELECTROTYPING AND LIGHT.—The new magneto-electric machine, devised by Mons. Gramme, consists briefly of a circular electro-magnet, with poles consecutively turned before the magnetic poles of a magnet, and the currents collected in a plane perpendicular to the poles. Without entering into any more extended explanation of the invention than that already published, as above indicated, we have now to note the results obtained in electrotypy, and the production of light through the agency of this machine. M. Gramme states, in *Les Mondes*, that at a rapidity of 275 turns, the instrument caused 8,101 grains of silver to be deposited in one hour, at 300 turns, 9,317 grains, and at 325 turns. 10,295 grains in a similar period. This last speed was too great, producing a heating of the coils which, if it had been continued, would have injured the machine.

A much larger apparatus was used for the production of light. Its height was four feet, and its weight about one ton. The wire rolled on the electro-magnets weighed 667 pounds, and that of the three coils used, 195 pounds. With 300 revolutions per minute, expending about four horse power, M. Gramme obtained a light equal to that of 900 carcel burners—a more immense artificial illumination than has ever heretofore been produced by electro-magnetic agency. The calorific effects, at the same speed of 300 turns, were remarkable. A wire of 28 lines, and one of iron of 52 lines in thickness, both 39 feet in length, were made red hot. The same iron wire, in a length of eight feet, was completely melted.

SYMPATHY BETWEEN TELEGRAPHERS.

To the Editor of the Journal of the Telegraph:

It is a rare qualification to keep silent when one has nothing to say, and not being prepared with any thoughts on telegraphing, I had concluded to trouble you with no more letters; but being a woman, must, after the fashion of my sex, indulge in the luxury of a few words, after having finished, just by way of postscript.

A characteristic, which all who have mingled with operators probably have noticed, is the strong bond of fellowship which unites them. Meeting under whatever circumstances, the hand is extended and warmly grasped, and no other introduction needed, except familiarity with the key; and although a curt demeanor may be sometimes manifested over the wires, there is an undercurrent of kindness which, if rightly appealed to, is seldom found wanting; and a very decided feeling, that quarrel as they may among themselves, "oprs." will stand up for each other against the world. If this sense of fraternity was entire, extending from the highest officer to each little messenger, its strength-giving influence to employees and profit to the company would be incalculable. But is not the feeling "*we*, the operators, and *they*, the company, almost universal"? Whether it is "*we*, the company, and *they*, the operators," my experience is too limited to say.

There is doubtless some excuse, when the idea creeps into the mind of an humble worker for a small salary, that there can be little in common between himself and a corporation owning millions, and, perhaps, the representatives of this powerful organization sometimes forget how much their prosperity and honor depend upon the combined integrity of a whole army of unknown individuals; nor can this want of sympathy, as far as it exists, be easily avoided, there being little opportunity for personal intercourse between officers and employees.

If we all, high and low, honestly did our duty, not from self-love, but for the good of the whole, how much better would body and soul be clothed and nourished, and how much surer attained the heights of preferment and ambition. In this age of the reign of dollars and cents, such a state of things is impossible, but even the contemplation of a higher life strengthens the heart to renewed effort.

It is well to remember, that we are the mediums for one of the noblest uses that science ever whispered into the ear of man. Each little office is a link in the electric chain which winds its sparkling length around the world, bids defiance to time and space, and draws the human family into closer bonds of unity.

Flashing warnings of quick coming danger, bearing messages of hope and comfort, of joy and calamity, birth and death, we are indeed the artery through which beats the great pulse of humanity. God has shorn the lightning of its terror and laid it harmless in our hands; let us receive the trust as coming from Him alone, and try to be faithful.

A.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, MARCH 15, 1873.

IGNORANCE OF THE REGULATIONS.

In many offices there appears to be much ignorance with regard to the manner in which the business of the company should be treated. In utter disregard of the regulations which govern the service, individual ideas of propriety are sought to be impressed in an arbitrary manner, often occasioning unseemly squabbles over the line, frequently causing delay in the transmission of messages, and in other ways proving detrimental to the Company's interest. It matters not who might be in the right in these contentions, the result is invariable—injury in some manner to the Company.

It would be well for managers of offices, if no better plan suggests, to copy out the rules applicable to each department of the service and affix them to the desks or tables of employés so that the proper course to be taken in conducting the business under their immediate charge would be clear and unmistakable. This, or some similar plan, would go far to lessen the evils complained of.

CONTEMPLATED REDUCTION OF RATES.

The Western Union Telegraph Company have under consideration, and the plans nearly matured, for a further reduction of tariffs, which is to be of the most radical and sweeping nature. The change contemplates the use of only ten different rates for the entire country, and will establish a uniform air-line distance rate between all offices in each of the divisions.

With their splendid system of lines, and improved apparatus for the transmission of messages, this Company is fully prepared to handle and expeditiously perform the increased business which it is believed will arise from these concessions. It is only in view of such increase that the contemplated reduction in rates can be justified.

The article upon the Duplex Telegraph, which appeared as an editorial in our last issue, was taken from an unpublished report of President Orton to the stockholders of the Western Union Telegraph Company.

PREPAID ANSWERS.

Among the items of correspondence in the JOURNAL of March 1st, are two enquiries relating to difficulties which had occurred under the operation of Rule 12.

The questions upon which we rendered decision in our replies are new, and relate to matters of much importance to the Company's service. We were correct in the main, as to the proper course to be taken in these individual cases, but we should have gone farther and have so framed our replies as to cause them to be applicable to the whole line.

Rule 12 reads as follows:

"Transient persons sending messages which require answers must deposit in advance an amount sufficient to pay for a reply of ten words. In such cases the signal "33" will be sent with the message, signifying that the answer is prepaid."

With regard to the first case, which represented that an answer of ten words was prepaid, and that the answer when received contained twenty-eight words, eighteen of which the party refused to pay for, the office from which the answer was sent acted wrongly in allowing a greater number of words than ten to be sent upon the check given.

In all cases of this nature the receiver should notify the party offering a message containing a greater number than ten words, as a prepaid answer, that such excess was beyond the limit and must be prepaid, or a sufficient guarantee be given to secure the Company from loss.

The second enquiry refers to the length of time that the amount deposited for a prepaid answer should be retained in the event of an answer not being received within what may be deemed a reasonable time, the proper reply would be as follows: and this will hereafter govern the service.

Answer.—Where parties have deposited money for an answer and none is received within a reasonable time, send a despatch to the office to which the original message was addressed, stating that the party who has deposited the money for an answer demands the amount returned, and that, unless the answer is received within a specified time, it will be returned, and that your office will not be responsible for the tolls upon the answer after such a time. But the money deposited must not be returned until it is certain beyond a doubt that the office from which the answer is due understands that the prepayment is withdrawn.

COUNTING ARBITRARY COMBINATIONS OF LETTERS.

It seems to have been a custom for some time past for receivers, in counting messages, to regard and pass such terms as "smorning," "safternoon" and "sevening," meaning "this morning," "this afternoon," "this evening," as one word. There is no warrant for this custom; on the contrary, it is a violation of the regulations. In Webster's Dictionary, the standard adopted by the Company, these terms are not to be found as words; therefore, they must be treated as a cipher which is composed of an arbitrary combination of letters. Rule 9 provides that

"Cipher messages, composed of simple English words in ordinary use, will be transmitted at usual tariff rates." All other messages in cipher, whether composed wholly or in part of figures, or arbitrary combinations of letters or words of any foreign language, when used as a cipher, will be estimated by counting each letter or figure as a word, and charged for accordingly."

HOW SHALL THE ALPHABET BE CHANGED.

The question of the desirability of changing the characters of the Morse alphabet, so as to avoid the elements of weakness contained in the spaced letters, is again being agitated. Spasmodic attempts to effect this improvement have from time to time, during past years, been made; but owing, probably, to the fact that these endeavors were wholly of an individual nature, nothing was effected. It is to be hoped that the present effort will result in a different manner.

The fact is well known to telegraphers, that by far the greater proportion of the errors which occur in the transmission of messages is attributable to the spaced letters of our alphabet, and, upon consideration, it doubtless will occur to them, as it has to us, that such being the fact, other characters should be substituted for those so objectionable.

If we assume it to be granted that there is good reason for a change, it will be proper to consider what shall be substituted in place of the letters to be discarded. We know of nothing better than those employed in Europe, and in fact in every part of the world but America, and when we accept these substitutions, our alphabet, with one or two exceptions, will be substantially the same as that in use in every other country.

From this point it is but a step for us to adopt the whole European alphabet. By so doing we should fill the only gap now open, and the language of the telegraph would become universal. There is no doubt that eventually the spaced letters will be abolished, and the sooner the better, for the welfare both of the companies and their employes. It is not to be supposed that telegraph companies will much longer continue satisfied to pay for errors which arise from an inherent weakness, and which can so easily be remedied.

We are convinced that the officers of the Western Union Company regard with favor the substitution of the European alphabet for our own, and only hesitate to give the necessary order to effect the change, from a feeling that their operators are not yet ready. Let us prepare, and by adopting this improvement as our own, show our employers that we regard their interests as identical with, and inseparable from those of their employes. Proof will thus be manifest that the wisdom of the telegraphers of America is only equalled by their skill, which, taken as a class, is not even nearly approached by any similar body in the world.

EXECUTIVE ORDER No. 145, in relation to stamps and complimentary franks of 1872, and also an Order of general instructions to Transfer Offices, appears on page 118.

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PLAYING WITH THE TELEGRAPH.

Don Piatt, writing to the New York *Herald* about the Inauguration Ball, makes the following hit at the Post-Master General:

"Mr. Creswell, observing the telegraphic arrangements made to regulate the bands and various committees, begged permission to run the same for a little while. Of course this favor was granted him, but he created such confusion that it came near abruptly ending the festivities. He had all the bands going at once, and while one was playing the 'Dead March in Saul,' another was playing the devil with 'Yankee Doodle.' This does not speak much for Government telegraphy."

Is it not rather rough in the "home organ" of Mr. Creswell to speak thus disparagingly of the results of his first attempt to manage the telegraph. But just consider what the result would have been if, instead of handling the bands by telegraph, he had communicated with them by mail.

At last we have an electrical and telegraphic ghost. Its operations, fortunately, are thus far confined to one room, and to the instruments and wire contained therein, but there appears to be no certainty that its manipulations can be limited to that small compass of space. Let us, however, hope that the shade of this departed telegrapher will not seek to enlarge its sphere, but will remain content in the field in which it apparently holds undisputed sway; but we should breathe more freely if it could be removed from temptation. Perhaps those of our modern apparitions, which amuse themselves by throwing rocks, breaking dishes, and other innocent recreations, need a reinforcement; they have been very quiet of late. If, however, it must be telegraphing, will not some one in the confidence of this wraith, acquaint it with the prospectus of Prof. Loomis' aerial telegraph scheme. The opportunity thus afforded, to aid in perfecting a project so well calculated to advance scientific knowledge and human welfare, would command at once the gratitude of any well-disposed ghost, as also that of the endangered telegraph companies; and last, but not least, that of the professor himself, who, without such assistance, may, possibly, fail to find and utilize his electric strata.

The scene is laid at Dubuque, Iowa, and the story is thus told by the New York *Tribune*:—

A young man, intending to go into the business of telegraphing, purchased a pair of repeating instruments, with batteries and other apparatus, which he set up with a connecting wire in his room. To his great astonishment the instruments began to work of their own accord, "with a systematic and rythmic cadence about the clicks of the armature, analagous to those heard in the ordinary telegraph office." The ghost operated very quickly, but being requested to be a little slower in its communications, it kindly complied; and it was found that the clicks spelled "Edward Keats, of Baltimore." For many succeeding days the instruments have continued to work without contact. A printing machine was procured, and the ghost announced in Roman letters that he was "Edward Keats, of Baltimore, an operator on the National line." He has since telegraphed a number of "communications which cannot with propriety be given to the public;" and it turns out that he is assisted by a female shade named "Ettie Baker, late daughter of Judge Baker of Geneva, Ill."

We are living in an extraordinary time. The ghosts that squeaked and gibbered in the Roman streets were nothing to these modern wonders. The fact is, there are more things in heaven and earth than are dreamed of in our philosophy. Bless the memory of Shakespeare, for transmitting to us this easy solution of every possible mystery.

ONE OF THE ATLANTIC CABLES BROKEN.

After nearly two years of uninterrupted operation of both the Atlantic cables of the Anglo-American Telegraph Company, the 1865 cable failed at twenty minutes past twelve o'clock P. M. on Tuesday last. The tests at Heart's Content show that the fault this time is on the other side, probably not far from the Irish coast.

The 1866 cable and the French Atlantic cable are both in excellent condition, and will be able to satisfactorily and promptly transmit all the business offering. Probably the only unfavorable result of the interruption will be the expense to the company of picking up and repairing the cable, and this they can well afford to do, being in a very prosperous condition, The new cable which is to be laid this season by the French Atlantic Company is rapidly approaching completion, and within a few weeks New York will be in direct cable communication with Great Britain.

APACHE TELEGRAPH.

The Apaches have a very simple and yet effective system of telegraphy, which has unquestionably been in vogue from time immemorial. Lookouts are stationed on every prominent peak, within the range of one another's vision, commanding a complete view of the entire country. No human being can enter the region under surveillance unnoticed. Anything happening necessary to communicate to his fellow-watchmen, the lookout at once ignites a pitch-pine brand, which he moves in a manner intelligible to his confederate on the adjacent eminence, each movement having a significance familiar to them. This is repeated with lightning rapidity from mountain top to mountain top, until it reaches the chief in his fastness. Instructions are conveyed to his scouts in a like manner. Mr. Wm. E. Smith, manager of the Western Union Telegraph office in this city, has a magnificent chromo, illustrating this Apache telegraph. The original painting from which it was copied was taken from life, the scene being on the highland on the banks of the Gila River, the waters of which are to be seen meandering in the distance.—*Daily San Diego* (Cal.) *Union*.

THE FOLLY OF BAD PENMANSHIP.

The folly of bad writing is never better exemplified than in a telegraph office. A man rushes in, throws down a message, scrawled and blurred. It is important that that message should be sent instantly; at least ten thousand dollars are depending upon a speedy answer. The operator seizes it, and whisks away to call "Philadelphia." In less than a minute he is sending the message—in three seconds he is "stuck," and he cannot for the life of him make out the next word. Forthwith the messenger boy is sent to the office of the sender (a half-dozen blocks away) to find out what the obscure word is. The sender is not in—his clerk does not know what the word should be, it being a cipher message. Twenty minutes' fruitless search in the Stock Board, Gold Room, and other places where merchants and brokers "most do congregate," brings the messenger back to the telegraph office, just as the sender comes in for his answer, only to be told that his message has not been sent yet. No one is to blame but himself, and his well-known habits indicate that the adoption of the proverb, "the more haste the less speed," will be but transient.

ELECTION OF PRESIDENT AND DIRECTORS OF THE SOUTHERN AND ATLANTIC TELEGRAPH COMPANY.

On Monday, March 10th, the annual meeting of the Southern and Atlantic Telegraph Company was held at the office of the company, No. 51 New street, in this city.

It was announced to the meeting that the full amount of subscriptions to the stock of the company had been obtained, and that the company had no more stock to place. The company will now proceed to complete the extension of its lines to New Orleans.

Mr. James R. Crenshaw was reëlected President, and a Board of thirty Directors for the ensuing year.

A meeting of the new Board of Directors will be held at the above office on Monday, March 24th, to elect other officers, and complete the organization of the company for the ensuing year.

RUMORED PURCHASE OF THE FRANKLIN COMPANY.

For some days past statements have been current in telegraphic circles to the effect that the Franklin Telegraph Company has been purchased by the Atlantic and Pacific Telegraph Company, and will be managed in the same interest. Inquiry as to the truth of the matter elicited the statements that negotiations had been pending between the two companies for considerable time, and that the purchase had been consummated on Saturday by the payment of $37 per share for a controlling number of shares in the Franklin Company. Application was made to the Secretary of the Atlantic and Pacific Company for information on the subject, but he would not impart any, stating that while he knew all that was occurring in relation to the purchase, he did not feel at liberty to tell the news at this time. E. D. L. Sweet, the general manager of the line, was next visited, but he also declined to give any information. Not one of the executive officials of the Franklin Company was to be seen, as they were all in Boston.

William Orton, President of the Western Union Telegraph Company, was visited with more satisfactory results. Mr. Orton said that he, too, had heard the statement that a controlling interest in the stock of the Franklin Company had been purchased on Saturday, at 35, by the Atlantic and Pacific Telegraph Company. Still more recently, however, he had heard that the Franklin Company had been bought by individuals, probably indirectly in the interest of the Atlantic and Pacific, and he had derived the impression that there was an attempt making to put the outside companies, or the lines competing with the Western Union, under one management. The details Mr. Orton could not supply.

Subsequent inquiries confirmed Mr. Orton's belief that a combination was organizing among the lines competing with the Western Union. The lines supposed to be embraced in the new organization are the Atlantic and Pacific, office No. 33 Broadway; the Pacific and Atlantic, office No. 14 Broad street; the Southern and Atlantic Telegraph, office No. 51 New street, and the Franklin Telegraph, No. 11 Broad street.—*N. Y. Tribune*, March 14th.

COMPLETION OF A NEW LINE.

The Western Union Telegraph Company have completed and put into operation an entirely new line, extending from St. Louis, Mo., to Galveston, Texas.

Mr. Sprague Cheeney, of the Kalamazoo, Mich., Western Union Office, has been appointed Train Dispatcher for the Detroit and Milwaukee Railroad.

Mr. Waldo H. Collins has been appointed inspector Gold and Stock Telegraph Company, at office 61 Broadway, New York.

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ON THE ALLEGHENY SYSTEM OF ELECTRIC TIME SIGNALS.

BY PROF. S. P. LANGLEY.

The necessity of a uniform standard of time for the railways of the United States is one which is growing into importance with the increasing extent of our railway system; and we are, ere long, in this country, to be called on to settle for ourselves a practical problem which has already been solved in England, and which is beginning to make its demand for solution upon the managers of our railroads.

Since past experience shows that their probable adoption of a new and common standard will introduce it to public notice and discussion, and then to adoption by cities and individuals, it is desirable that this should not be done without the direction which intelligent scientific co-operation will give to a movement originated by the demands of intercontinental traffic As few are aware how generally this co-operation has already been invoked, nor to what extent the public is indebted to observatories for increased security of transit, it has seemed that an account of what has been done in this direction in any one of them would be of interest.

The subject was first specially considered at the Allegheny Observatory some three years since, and a plan was arranged for the managers of the Pennsylvania Railroad in 1869. Previously to this, however, at the request of some jewelers of Pittsburg, the time had been transmitted to their stores, at a distance of some miles from the observatory. The system now described has been in use for nearly three years, in furnishing the Pennsylvania Central Railroad with its official standard of time; and by it the time is now sent daily to Philadelphia on the east, as far as Lake Erie on the north. and to Chicago on the west, regulating the clocks on a number of minor roads over whose wires it goes, as well as on those of the principal Southern lines connecting the Atlantic with the Mississippi. Thus passing, as it does, over several thousand miles daily, it is believed to be at present one of the most extended systems of time distribution in the world.

The observatory is on the summit of the ascent on the northern side of the valley of the Ohio, about two miles in a direct line from the offices of the Western Union Telegraph Company in Pittsburg, and rather more from those of the Pennsylvania Central, and Pittsburg, Fort Wayne, and Chicago roads. It is connected with these points by three independent lines of telegraph. One of these runs to the Western Union offices, and thence to the stores of a considerable number of jewelers in Pittsburg. This is called the "jewelers' line." The second, connecting the observatory through the offices mentioned with Eastern Pennsylvania and New Jersey Railways, and also with Chicago, is known as the "Railroad line." The third, consisting of a double wire or "loop," communicating with the city, is employed occasionally for the observatory's own messages, and when (as, for instance, in longitude determinations) it is wished to send sidereal time, without interrupting the regular transmission of signals from the mean-time clock. In the transit room, in the western wing of the observatory, are kept the sidereal clock by Frodsham, of London, and the principal mean-time clock, by Howard, of Boston.

On the escape-wheel arbor of this, the standard mean-time clock, and turning with it, once a minute, is a wheel cut with sixty sharp radial teeth, of which those corresponding to the 50th, 51st, 52d, 53d, 54th and 59th seconds of the minute have been removed by a file. Near the clock is a "repeater," the circuit through whose coils passes through a local battery, through a second clock in the computing room, and then through the standard clock. Each wire terminates in a delicate spring, close by the wheel just mentioned. While the extremities of these springs, which are shod with gold and platinum, rest in contact, the circuit is unbroken; it is opened by the minutest lifting of one from the other, and this is effected automatically by means of a ruby attached to one of them, and placed within reach of the wheel above mentioned. As each of these teeth passes, the ruby, and with it the spring, is lifted through a minute distance. (Not in practice more than one one-hundreth of an inch, and usually much less.) Once a second, therefore, the circuit is opened during a period of probably less than a twentieth of a second, and as the wheel advances a tooth with each vibration of the pendulum, the armature of the repeater is raised each second of the minute, until the 49th is completed.

Since the teeth corresponding to the next five seconds have been filed away, during those seconds the jewel is not touched nor the circuit opened. The consequent silence of the "repeater's" beats draws attention to the fact that the end of the minute is approaching, its completion being indicated by the short pause caused by the absence of a tooth at the 59th second.

This action is repeated in every minute of the twenty-four hours, without variation. The particular second is thus identified, but one minute is (so far as the action of the standard clock is concerned) not distinguished from another. To do this is the work of the subsidiary clock in the computing room, through which the local wires are led, as has been mentioned. This subsidiary clock (made by Howard, of Boston) may be called, for distinction, the "journeyman," and its principal office is not to give the time, but to interrupt the circuit, which it does on or near the completion of the 58th minute, closing it again about half a minute before the completion of the hour. When the circuit is opened by the journeyman, the repeater is silent for a minute and a half; when it is closed, the standard is again heard ticking on the repeater, and the ensuing short pause evidently precedes the first second of the first minute of the hour. The time is thus wholly derived from the standard clock, and is independent of any other, the journeyman having no power to control or in any way react upon the primary, and being able only to interrupt the message it sends, not to falsify them.

The mechanism for effecting the transmission of the time is essentially that already described, but more is needed to ensure against possible interruption. This may occur from several causes, prominently from oxidation of the platinum or gold contact surfaces; when the current must be interrupted while they are cleaned, if there be no other clock. To meet this contingency a chronometer, of peculiar construction, was made for the observatory by Frodsham. It resembles the ordinary marine chronometer in external appearance, but contains in miniature the apparatus for breaking circuit already described, the wheels being cut so as to give the same signal of the approaching end of the minute as the standard clock. The peculiarity consists less in this, however, than in a device by means of which it can be caused to gain or lose any fractional part of a second, or any number of seconds, without being stopped, and without any disturbance of its normal rate, except while the change is being effected. This chronometer is to replace the prime clock in the circuit, during any temporary stoppage of the latter for repair or adjustment.

The mechanism which has just been described acts in connection with the local circuits of the observatory; one battery being employed for the sidereal clock and chronograph, and another for the mean-time standard. Any interruption of the main external circuits is shown at once, by the action of a galvanometer in each, which makes an audible and visible signal when the circuit is opened. The accessory apparatus, such as batteries, relays, switchboards, and so forth, which are used in every telegraph office, it will be superfluous to describe here in detail, but before following the operation of the electric current, outside the observatory, it will be well to speak of the method which has been adopted as likely to ensure most accuracy in the time-keepers which control it.

The transit instrument in the western wing is of four inches aperture, and with it and the chronograph, observations for time are made on every fair night of the year, except on Sunday, when, if complete determinations have been made on the preceding night, none are taken. The instrument is of sufficient power to follow the principal Nautical Almanic stars in the day, and these are used (or more rarely the sun), when the weather permits, if the usual night observations have been missed. From three to six stars are customarily taken, the azimuthal error of the instrument being found from the observations of each night, after the other corrections are applied, and the results determined from the chronograph and the sidereal clock. The mean error in the resulting determination of the sidereal clock correction, is from three to four hundreths of a second; but it cannot be assumed that that of the mean time standard is known within these limits, except at the time that the observations are freshly made.

It may be desirable to point out where the system pursued here differs from that in which a few signals are sent at stated hours, as at Greenwich. In the case of the time ball, for instance, dropped daily by a clock at Greenwich mean noon, it is customary to compare the mean time clock which drops it, with the sidereal time a few minutes before twelve. If it (the operating clock), be slow, it is caused to gain, and if fast, caused to lose, an amount needed to bring it to coincidence before the automatic action gives the signal

The time of this signal is nominally exact, but in fact involves the variations in rate of the standard clock or clocks, which are treated in the comparison as having their errors absolutely known. It is by no means meant to criticise this procedure, but to point out that, as error must exist where the rates of the clocks are treated as constant in the intervals between observation, no less real accuracy is reached in the method employed here, in which (as the signals are being constantly sent) the signalling clock has no less nominal error at noon (for instance) than at any other hour.

When the sidereal clock has entered its beats upon the chronograph during the time of observation, the record is not interrupted until the mean time standard having been put into the same circuit, both clocks have automatically entered their time on the sheet together, and the break circuit chronometer has done so also. The sheet being removed, and the breaks of the transit observer measured, the comparison of the various clocks with electric attachments are taken by measurement on the same sheet, and the others compared with the sidereal clock by noting coincidence of beats by ear. The resulting errors of all are then determined, reduced to a common epoch and entered in a permanent record kept for the purpose.

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Those who are aware of the number of patented devices for controlling distant clocks by electricity, may perhaps feel surprise that so little mention has here been made of their use.

Some of these are of extreme ingenuity and much promise, and the English patents covering such points are alone to be reckoned by scores. Plans have been submitted to the writer by which the clocks along any number of miles of road could be set right, and brought to uniform time in a few seconds by the operator at the observatory, and these plans appear feasible. The arrangements adopted here, as the reader will observe, do not greatly differ from those employed in telegraphic determinations of longitude, and in fact a prolonged examination of very many ingenious devices for directly controling distant clocks led the writer to set them all aside, and to employ methods not differing in principle from those in use already, for purely scientific ends, in most American observatories.

The necessity of a uniform standard of time over the whole country, which was alluded to in the outset as one of growing importance, has not been further directly touched upon in this article, which is yet, as a whole, devoted to describing the means of meeting it. The evident tendency, in thus sending the time from one standard over so large an extent of territory, is to diminish the number of local times, and so prepare the way for a future system, in which, at least between the Atlantic and the Mississippi, they shall disappear altogether.

What point shall be chosen is of less importance than that some *one* shall be used and universally.

The subject is one which has hitherto attracted little public attention, but it does not seem unsafe to make the assertion, that the causes which have almost insensibly effected such a revolution in England, will in a few years more bring it about here.

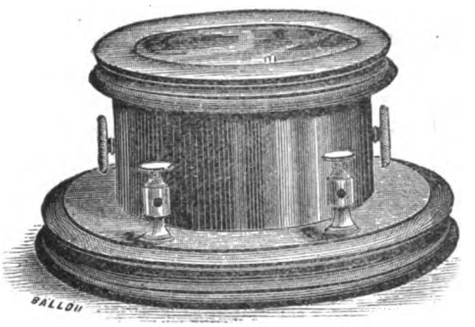
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The invention of the electrical balance—the most beautiful and perfect apparatus known for accurate electrical measurements—has been commonly attributed to Professor Chas. Wheatstone, and, in fact, is almost universally known among electricians as the "Wheatstone bridge." In reality the apparatus was not invented by Wheatstone, but by Mr. S. Hunter Christie, of the Royal Military Academy, Woolwich, England. Mr. Christie read a paper upon his invention before the Royal Society in 1833, ten years before Professor Wheatstone brought it for the second time to the notice of the public, in his remarkable paper upon electrical measurement in 1843, in which he stated the source from which the invention was derived, and gave the dates of the papers which Christie had written upon the subject. It was therefore, not the fault of Wheatstone that his name became attached to the arrangement. The value of the bridge was vastly increased by the improvement effected by Mr. Werner Siemens. The first attempt to use the instrument for testing coils of insulated line wire was made by Dr. Siemens in 1847-48. It was soon found that the range of the instrument was insufficient, and it occurred to him to construct the resistance boxes so as to make the two arms of the balance variable, which gave a much larger range of reading, and this arrangement is now in univeral use among electricians. The excellent arrangement of resistance boxes with metallic plugs, for cutting out or short-circuiting the coils, is also due to Dr. Siemens, and has added much to the convenience and reliability of electrical measuring apparatus.

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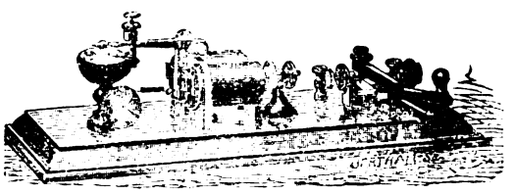
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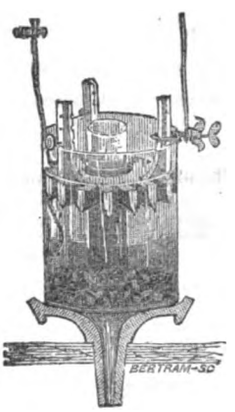
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 9. NEW YORK, APRIL 1, 1873. WHOLE NO. 130.

EXPERIMENTS SHOWING THAT ELECTRICITY RESIDES UPON THE SURFACE.

Electricity (subject to the exceptions mentioned below) resides exclusively on the external surface of a conductor. This is perhaps implied in the experimental fact frequently observed by Columb, that when a solid and a hollow sphere of equal external diameter are allowed to touch each other, any charge possessed by either is divided equally between them. A direct demonstration is afforded by the following experiment of Biot:

We take an insulated sphere of metal, charge it with electricity, and cover it with two hemispheres furnished with insulating handles, which fit the sphere exactly (Fig 1). If the two hemispheres be quickly removed, and presented to an electric pendulum, they will be found to be electrified, while the sphere itself will show hardly any traces of electricity. We must, however, remark that this experiment is rarely successful, and that generally the sphere remains very sensibly electrified. The reason of this is, that it is very difficult to remove the hemispheres so steadily, as not to permit their edges to touch the sphere after the first separation.

The following is a much surer form of the experiment:

A hollow insulated sphere, with an orifice in the top, is charged with electricity (Fig. 2). A *proof-plane*, consisting of a small disc of gilt paper insulated by a thin handle of shellac, is then applied to the interior surface of the sphere, and, when tested by an electric pendulum or an electroscope, is found to exhibit no trace of electricity. But if, on the contrary, the disc be applied to the external surface of the sphere, it will be found to be electrified, and capable of attracting light bodies. Faraday varied this experiment, by substituting a cylinder of wire gauze for the sphere. This cylinder rested on an insulated disc of metal. The disc was charged with electricity, and it was found that no trace of the electricity could be detected by applying the proof-plane to the interior surface of the cylinder.

The following experiment is also due to Faraday. A metal ring is fixed upon an insulating stand. To this ring is attached a cone-shaped bag of fine linen, which is a conductor of electricity. A silk thread, attached to the apex of the cone, and extending both ways, enables the operator to turn the bag inside out as often as required, without discharging it. When the bag is electrified, the application of the proof-plane always shows that there is electricity on the outer but not on the inner surface. When the bag is turned inside out, the electricity therefore passes from one surface of the linen to the other.

There are two exceptions to the rule that electricity is confined to the external surface of a conductor.

1. It does not hold for electric currents. In connection with galvanic electricity, the resistance which a wire of given length opposes to the passage of electricity through it, depends not upon its circumference but upon its sectional area. A hollow wire will not conduct electricity so well as a solid wire of the same external diameter.

2. Electricity may be induced on the inner surface of a hollow conductor by the presence of an electrified body insulated from the conductor itself. If an insulated body charged with electricity be introduced into the interior of a hollow conductor, so as to be completely surrounded by it, but still insulated from it, it induces upon the inner surface a quantity

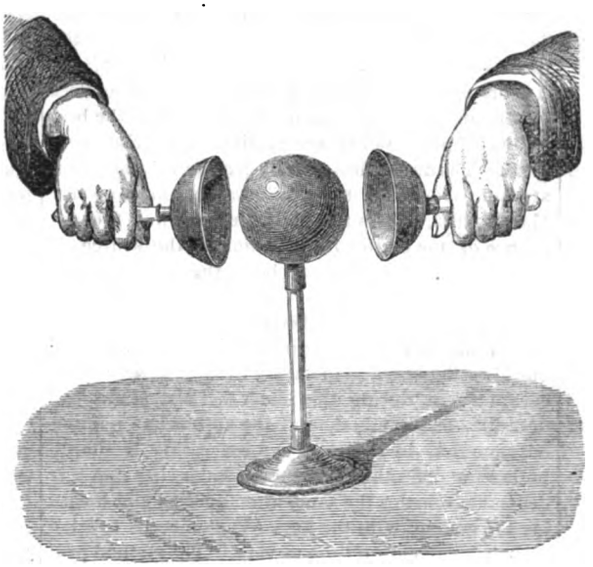


Fig. 1.

equal to its own charge, but of opposite sign. If the conductor is insulated, an equal quantity, but of the same sign as the charge of the inclosed body, is repelled to the outside, and this is true whether the conductor has an independent charge of its own or not. In this case, then, we have electricity residing on both the external and the internal surfaces of a hollow conductor, but it still resides only on the surfaces.

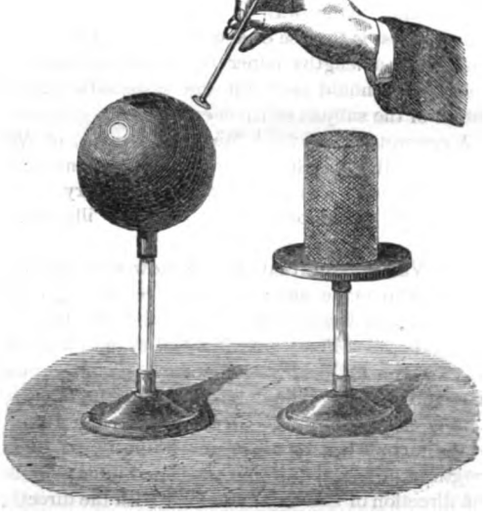


Fig. 2.

If a conducting body, connected with the earth, be introduced into the interior of a hollow charged conductor, so as to be partially surrounded by it, the body thus introduced will acquire an opposite charge by induction, and by the reciprocal action of this charge, electricity will be induced on the inner at the expense of the outer surface of the hollow conductor, just as in the preceding case.

The effect of introducing a charged body within a hollow conductor is well illustrated by the experiments of Faraday with insulated ice pails. These experiments, which are fully described in our article upon Static Induction, published in the JOURNAL of February 1st, 1873, prove that when a hollow conductor is electrified, however strongly, no effect is produced upon pith-balls, gold-leaves, or any other electroscopic apparatus in the interior, whether connected with the hollow conductor, or insulated from it, provided, in the latter case, that they have no communication with bodies external to the hollow conductor. Faraday constructed a cubical box, measuring 12 feet each way, covered externally with copper wire and tin-foil, and insulated from the earth. He charged this box very strongly by outside communication with a powerful electrical machine; but a gold-leaf electrometer within showed no effect. He says, "I went into the cube and lived in it, using lighted candles, electrometers, and all other tests of electrical states. I could not find the least influence upon them, or indication of anything particular given by them, though all the time the outside of the cube was powerfully charged, and large sparks and brushes were darting off from every part of its outer surface."

The fact that electricity resides only on the external surface of a conductor, combined with the fact that there is no electrical force in the space inclosed by this surface, affords a rigorous proof of the law of inverse squares. For if the conductor be a sphere removed from the influence of external bodies, its charge must be distributed uniformly over its surface. Now it admits of proof, and is well known to mathematicians, that a uniformal spherical shell exerts no attraction at any point of the interior space, if the law of attraction be that of inverse squares, and that the external attraction does not vanish for any other law.

When the proof-plane is applied to different parts of the surface of a conductor, the quantities of electricity which it carries off are not usually equal. But the electricity carried off by the proof-plane is simply the electricity which resided on the part of surface covered by it, for the proof-plane, during the

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time of its contact, is virtually part of the surface of the conductor. We must therefore conclude that equal areas on different parts of the surface of a conductor have not equal amounts of electricity upon them. It is also found that if the charge of the conductor be varied, the electricity resident upon any specified portion of the surface is changed in the same ratio. The ratio of the quantities of electricity on two specified portions of the surface is in fact independent of the charge, and depends only on the form of the conductor. This is expressed by saying that *distribution* is independent of charge, and that the distribution of electricity on the surface of a conductor depends on its form.

EARTH CURRENTS.

An ordinary meeting was held on Wednesday evening, the 12th ult., of the Society of Telegraph Engineers, Latimer Clark, Esq., Vice-President, in the chair.

Three communications from Mr. Stout, of Lerrick, on "Earth Currents," was read by the Secretary. In the first paper the writer stated that he has often had the needle of his instrument vibrated by accidental or earth currents, and sometimes to such an extent that it was impossible to continue working, even with a single needle instrument. These currents seem to be the strongest when there is a considerable aurora, but sometimes there is a brilliant aurora and very little current or none at all. He had observed that upon a shower of snow coming on, the currents commenced, that they increased in intensity until the storm was thickest, that they lessened as the storm subsided, and disappeared when the shower ceased. This was more noticeable when the snow came in large fleecy flakes. Hail did not seem to have any effect on the currents. The two other communications stated the results of observations made on the occurrences of aurora and their relation to earth currents.

Mr. G. K. Winter, F. R. A. S., read a paper on "Earth Currents." The author stated that the electric telegraph had been but a short time in existence when it was found that occasionally very powerful currents from some unknown source showed themselves in the wires. Happily these disturbances were found to be neither of very frequent occurrence nor of long duration. Subsequently, however, as more delicate instruments were used, it was discovered that the wires were scarcely ever free from the currents, and though they were rarely strong enough to interfere seriously with speaking instruments, yet they considerably embarrassed testing operations. The author has, for many years, given these currents a good deal of attention, and, although his experiments are, as yet, very far from being complete, he thinks that some of the results already obtained are of some interest; and, as the methods he has adopted are in some respects novel, a few words on the subject might not be unacceptable. He commenced by assuming that the currents in the wires are due to large streams running through the earth, and that the strength of the current in any one wire is influenced by two circumstances—first, the strength of the earth stream, and, secondly, by the angle it makes with a line joining the two earth-plates. Of course the resistance of the circuit, and the distance between the two earth-plates, have their influence. Their effect may, however, be looked upon as practically a constant factor for any one wire. The variation of the current in any one wire must be attributed to variations in the circumstances above mentioned. The object of his experiments was to determine the two influences separately. By making simultaneous observations on two wires placed at right angles to each other the separation becomes very easy. The experiments were made near Madras. Two wires were erected, each two miles in length, and approximately of the same resistance, one running north and south, and the other east and west. The instrument used for measuring the current was a tangent galvanometer. Right and left deflections were taken, and the mean of the two was calculated. The currents of both wires were observed on the same instrument. The whole of the changes were made by a very simple series of switches. The observations occupied about one minute, and were reduced in a very simple way. The method adopted was simply an application of the principle of the parallelogram of forces. It is scarcely to be expected that the stream is uniform in its strength, direction, and variation in different parts of the world. The apparatus for the measurement of the two elements of the currents need not be of an expensive character. There are doubtless numbers of people in different parts of the world who are qualified to make observations. Of course it was necessary, for proper organization, that the matter should be taken up by some scientific body, and that definite directions for observations should be drawn up. The author believes the absolute magnetism of the earth to be much more constant than is imagined. A more practical bearing of the question is the effect of the derived currents on our tests, and the best means of eliminating errors likely to arise from them. The author has already treated this question at some length in the *Philosophical Magazine* for March, 1872. It is the variation and not the existence of the earth-current which is the source of the chief difficulty, for as both the electromotive force and resistances are unknown we require two observations to enable us to determine either; and it is difficult to make two observations so quickly one after the other as to ensure the constancy of the earth-current during the interval. Mr. Mance has described one method, and the author has pointed out another, in which one observation is simply noting the deflection, and the second seeing that this deflection remains the same after making and breaking the contact with the key. The object is to give the earth-current no time to vary. The method proposed by the author was described in his paper in the *Philosophical Magazine*, and is simply a modification of Mr. Varley's method of measnring a single cell by means of a differential galvanometer. The difficulty arising from the sudden flow through the galvanometer, is common, in a greater or less degree, to both Mance's method and that described by the author. One way in which he proposes to remedy this is the use of a condenser. The author concluded a lengthy paper by recommending that the Society should take up the systematic investigation of the subject of earth-currents.

A communication from Mr. J. M. Graves, of Valentia, detailing a series of minute observations on the same subject, was read by the Secretary. The paper was accompanied by various illustrative tables.

Mr. Varley said that Mr Barlow was the first person who made any systematic record of earth-currents. He began in 1846, with the assistance of one of the Vice-Presidents, Mr. Culley, and used the wires of the Midland Railway for his observations. A record of these would be found in the *Transactions of the Royal Society*. He found that the strength of the current was by no means proportional to the length of line in circuit, but depended upon whether the direction of that line coincided with the direction of the earth-current; that there were periods of maxima and minima; that there were always earth-currents on the line; and that these earth-currents were not disturbed by auroral currents, which were very erratic. In 1847 he (Mr. Varley) observed the first earth-current which it fell to his lot to see. It was on the occasion of a tremendous auroral display, in which the arch was distinctly visible above the horizon for several degrees, and all the lines in Great Britain were stopped for the time being. That was the first time that attention was strongly drawn to the subject, and the question was taken up by the Astronomer Royal, Mr. Airey. Mr. Walker and the Astronomer Royal had now been making observations by means of cross wires for more than twenty years, and had drawn out the true direction of the currents upon the principle of the parallelogram of force which Mr. Winter had described. It was well to observe that if experimenters used an earth-plate of limited size its resistance would vary a good deal, owing to the hygrometric condition of the earth varying, and other causes. If they attempted to get a very large earth-plate by connecting the wire with the gas-pipes, then they would get not only the current due to the wire itself, but also that which was due to the extensive system of pipes with which it was connected. In 1855 he observed, on a line of only two miles length, a current so strong that it stopped the working. The enormous strength of the current on so short a line led to some astonishment; but he thought that there was no doubt that the earth-current was not one that was the potential of the difference between the two lines of wire, but arose from the conductors afforded by the gas pipes. In 1847 he observed an earth-current between Dawlish and Teignmouth, a distance of three miles, and in endeavoring to measure its potential he found that twenty-four cells of a sand battery were insufficient to balance it. From 1852, onwards, he had kept very careful records at telegraph stations of all the earth-currents he could observe, and some very curious results had been obtained. First of all, he found that there were certain localities between which the currents were strongest, the strongest of all being between Ipswich and London. Ipswich might be considered as a sort of funnel-shaped indentation of the coast. Off King's Lynn there was a similar funnel, and this place was not far north of Ipswich, and yet the currents from the former place were very feeble. But farther north, from Newcastle for instance, they got the same earth-currents as were generally got from Ipswich, which was at the southward of King's Lynn. It was frequently found that, while the currents from Newcastle to London, and Ipswich to London, were positive, that from King's Lynn would be faintly negative. On drawing the neutral line, it became evident that that neutral line very nearly followed the line of the coast; and that was most likely due to the circumstance that arable land, as compared with sea water, was a very poor conductor, and consequently the currents observed on this particular land line were those brought by the sea, arrested in a great measure by the non-conducting land. If observations were made simply on such currents, it would not be right to infer that the general current of the year was all the strength indicated upon the line. It would be very much feebler, the concentration being due to the great currents of the whole earth being arrested by the less conducting land. This was borne out very strongly by the fact that the currents observed from Amsterdam to London, which were almost in the same line as Ipswich and London, but 130 miles farther apart, were but little stronger than the currents from Ipswich to London. He had frequently endeavored to measure the earth-currents on

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short wires. In his garden he had a number, varying in length from 200 to 600 yards, and laid in different directions; but he found that the variations, due to the different states of moisture and other conditions, were so great that the earth currents could not be recorded with any certainty. In fact, he knew of nothing more difficult than to get two earth-plates, in different parts of the earth, neutral to the earth or of equal potential. In the first paper attention was drawn to the fact that the earth-currents varied very much with the snow. He was afraid that Mr. Stout had mistaken the cause of that variation. The changes had probably been due to the snow producing increased leakage between the wires and the earth, by connecting the wires with the poles, or possibly, with a wall. The rapid variation of the earth currents which Mr. Stout had observed he (Mr. Varley) thought must be due to some station endeavoring to call, and not to the earth tself, for he had never, on any one occasion, found an earth current to change from maximum positive to maximum negative in less than fifty seconds. More generally the change occupied several minutes, and once he saw a continuous current of twenty minutes duration. In November and December, 1867, he took a number of observations on the Rigi with reference to the existence of the so-called negative cloud. He did once observe a negative cloud of 400 cell power during a snow-storm, but the atmosphere above was negative for only an hour and a half, and it then resumed its normal positive condition. He mentioned this because it would be interesting to ascertain whether the formation of snow really influenced the electrical conditions of the atmosphere. The subject of earth-currents had caused him very serious doubts as to the existence of long cables. When the 1865 cable broke, after 1200 miles had been laid, a series of very powerful earth-currents showed themselves, and Mr. Graves, who was then at Valentia, stated that so great was their power that they produced a distinct arc across his key over a distance of one-tenth of an inch. He (Mr. Varley) could not assume that the power could have been less than 2,000 cells of Daniell's battery. He had frequently seen, between Ipswich and London, a difference of from 70 to 150 cells. When Admiral Fitzroy was establishing his signals, he (Mr. Varley) observed on two occasions that earth-currents were followed by a change of weather. This fact was communicated to the Admiral, and proved of so much value to him that for some time he had information of the earth-currents regularly supplied to him. It was often possible, by their means, to predict a coming storm before the barometer became affected. The subject of the difficulty in testing arising from earth-currents was a very important one. He and Sir Wm. Thomson had found, in testing the 1866 Atlantic cable, that one of their chief difficulties was to find a satisfactory method of eliminating the earth-currents. The method of testing adopted with the long cables made by the Telegraph Construction and Maintenance Company, since 1865, had been what was known as the slide resistance coil. In order to get the true reading, all they had to do was to take the slide reading first with the positive current, then to take the slide reading with the negative current; add the two together, and divide by two. The mean slide reading would be the correct one, and the earth-current would be eliminated. Mance's method of measuring resistance was a very pretty one, and was probably known to all present; but there was a very serious objection in its use. Every time they altered the resistance to get the true reading they altered their zero, and unless the coils were constructed specially for each case the amount of variation in the zero was very much greater than the amount of variation due to a very considerable error in the adjustment of the resistance coils; and the consequence was that, in measuring a long cable, each time they shifted the zero they must wait at least 15 seconds, for the cable to get balanced, before they could get another, and thus the observation was so protracted that practically they could not get a reading at all. As to the use of condensers, if Mr. Winter would refer to a paper published by him (Mr. Varley) in 1860, he would there find the whole thing delineated. There was, however, another way of applying Mance's method, and it was less liable to the objection of the zero shifting so tremendously. At St. Pierre, last year and the year before, when the cable was broken, Mr. Gott adopted the method of putting in a condenser, making an artificial line to facilitate the testing. That answered exceedingly well, and all that Mr. Winter had said about it had been borne out in practice. The Atlantic cable ran nearly east and west; and he very frequently found, on looking over the tests, which were made almost every morning, that, although St. Pierre and Brest were nearly of the same potential, there was almost always a current through the gutta-percha in that direction, or *vice versa*. That is to say, the middle of the ocean was positive or negative to the two ends, while the two ends were pretty nearly of the same potential. Mr. Willoughby Smith informed him that on one occasion he could distinctly trace a current coming through the gutta-perch, and running across between the 1865 cable and the 1866 cable. This was indicated by galvanometers at each end showing a similar current running in each direction. This confirmed what he (Mr. Varley) had repeatedly observed on the French Atlantic cable. He had very little doubt that the aurora was due to the discharge of electricity from the upper regions of the air to still higher regions; and the question arose, Whence came this electricity of the atmosphere? He thought it would be found to be due to the rotation of the earth. It was well known that when the atmosphere in a tube was reduced from the present pressure of about 30 inches of mercury down to the 100th part of an inch, it had a conductivity, roughly speaking, as 5,000 cells to 300, or say 200 to 1. To get such a reduction in the atmosphere, we must go up between 20 and 40 miles. The air at this height would not rotate so rapidly as the earth, and might therefore be considered as stationary to the earth. We had, therefore, a magnet rotating inside a fluid conductor. Faraday had shown, putting the earth in rotation as it is, in its present direction, we should have the two poles positive the equator. He (Mr. Varley) believed that that was the source of the electricity of the atmosphere, because it was invariably found that the wind coming from the north pole was strongly electro-positive to the earth, and the aurora borealis generally occurred when the northern wind was coming.

The Chairman said that they had had three very valuable communications. Mr. Stout, in his communication, made a suggestion which he (the Chairman) made himself in print some years ago, which was, that the varying earth-currents which were visible during an aurora might be caused by the induction of the flashes of auroral light as they appeared overhead, and many observations which he had given seemed to confirm that view. The same writer made a suggestion that snow-storms might have some effect in producing currents, as if the currents were derived from the air itself, and not from the earth. He (the Chairman) agreed with Mr. Varley in thinking that in that point Mr. Stout was mistaken. No doubt the wires perpetually received currents from the atmosphere, but they were currents of high tension and very feeble quantity, and did not produce any effect on such instruments as those which Mr. Stout had at his command. He thought that Mr. Stout's views on that point needed confirmation. Mr. Winter alluded to the force of the earth, and said that he believed that force to be much more constant than was generally supposed. He (the Chairman) believed that Mr. Winter was perfectly right, and that idea was one which he had long entertained. It was evident that the sun was exercising a very enormous power over the currents of the earth. They all know that there was a period of eleven years, during which the sun's spots increased and decreased, and during those periods aurora were more or less intense, and there was more or less rainfall at the maxima and minima of the spots. Generally, it was quite clear that much of our magnetic force depended upon the sun. About 1850 two observers were looking at the sun with their telescopes in different parts of the country, and they both observed at the same time, and independently, a body apparently flash into the sun, and cause a very visible disturbance of the sun's chromosphere. After that they communicated with each other, and discovered that it had been found at the same moment that all the magnets in the world were disturbed. At first sight it seemed curious that the disturbance of the magnets should be instantaneous with the appearance in the sun, but that wonder vanished in consequence of a recent observation of Prof. Balford Stewart, who found that the velocity of the transmission of magnetism happened to be the same as the velocity of the transmission of light. Mr. Graves, in his paper, had given some very interesting observations, amongst which he mentioned a connection between earthquakes and earth-currents. That view had been somewhat confirmed by Mr. Varley. It was to be hoped that all the members of the Society would endeavor to bear these points in mind, and make observations upon them. He (the Chairman) believed that Mr. Varley's opinion with regard to the earth-currents proceeding from Ipswich and King's Lynn, was somewhat confirmed by the circumstance that we did not get violent earth-currents on our submarine cables generally. It seemed that the sea was so good a conductor that it prevented those great changes of potential which were found on land lines. He had considered the question whether it was best to retain the ends of a cable insulated during a magnetic storm, or to connect them to the earth. His own opinion was that the cable was safer when the ends were connected. But when they had tensions of 2,000 cells, which Mr. Varley believed to exist, it was certainly a serious thing to relieve the cables from the strain of such potentials. Certainly it would not do to attach one end to the earth and leave the other unattached. He agreed with Mr. Varley in thinking that the earth's magnetism was due to the rotation of the earth through the atmosphere. Mr. Winter had said that in the rotation of the earth there would not be a magnet rotate near a fixed conductor, but he (the Chairman) thought it extremely probable that at great elevations the tenuity of the air was so great that it remained more or less stationary.

M. Jamin states that when the current of electricity, used to magnetize a horse-shoe bar, attains a certain strength, the bar appears to return to its normal state, while either weaker or stronger currents produced magnetism. This state he terms that of concealed magnetism, and supposes it is produced by a peculiar distribution of the magnetic force.

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CORRESPONDENCE.

To the Editor of the Journal of the Telegraph :

The proposition to change the character formations of the telegraph alphabet in use in the United States, suggested in your issue of the 15th, has received considerable discussion throughout the offices of the Western Union Company's lines, as far as I have been able to learn ; and as you have heretofore thrown open your columns to your subscribers and correspondents, I take the liberty to submit the following :

The Morse alphabet has been in use nearly twenty-eight years, and during this time several parties have gotten up what they called "improvements," in which the spaced letters were done away with. These "improvements" must have been brought to the notice of the telegraph authorities at the time they were gotten up, for I remember having seen copies of the "Jones" and other alphabets written on cards, and placed on the operating tables, in several offices, as long ago as 1855 ; and if there was any *real* necessity for adopting another alphabet than the Morse, would it not have been apparent at that time, and one or other of the "improvements" adopted ? I do not now remember the formation of either of them, but they certainly were less objectionable than the English alphabet, called the "Continental" (or "International"), for the latter is very cumbersome in the "numeral" characters.

Is the adoption of the "Continental," or any other alphabet than the present (Morse), needed ?

Some operators have worked a number of years past with the Morse alphabet with perfect success, and see no necessity for its being thrown aside for another at this late day ; and would it not be as well to require those employed as operators to "*write* Morse," *and as the characters were intended to be made*, and *not* change the formation of letters to accommodate *their* notions.

There is no doubt that some operators send wretchedly formed characters in transmitting business, but would they not also send the "Continental" alphabet equally bad were it adopted by the lines in this country ? It seems clear, then, that the *real* and the *best* remedy lies in the application of a test to aspirants for situations, and let those who may be found "butchering" the Morse alphabet be sent back to learn it better before applying again.

Is there any reason why so many young operators should make such badly-formed letters, when others do not find it difficult to make them correctly ? Some test should be applied, and some examination gone through with, and if that fail, then a change of alphabet could be considered.

As to its being better for American operators to know and use exclusively the alphabet in use in Europe, is hardly a point worth maintaining or contending; for if an American operator desired to go to Europe to work, he could soon learn the "Continental" alphabet, previous to starting, while on the way, and when he begins to work in his new position, *from the force of circumstances*, there being no other alphabet in use there to bother him while he learns the new.

The change from the Morse to a new alphabet will entail upon good, as well as poor, operators the duty and labor of learning and practicing whatever is adopted—taking up valuable time needed for recreation; and, while labor and practice are considered, would it not be just as well for poor senders of Morse (and new beginners) to *learn it thoroughly* and *send it correctly*, thus obviating the whole difficulty sought to be overcome ?

J'AI PARLE.

ON THE PROPOSED CHANGE OF ALPHABET.

CLEVELAND March 22, 1873.

To the Editor of the Journal of the Telegraph :

The last JOURNAL seems to so seriously agitate the question of changing the Morse system, that I feel prompted to discountenance the idea as not only useless, but injurious. It is generally supposed, and possibly in some instances true, that a majority of errors are made by misapplying letters with spaces. My experience of about eighteen years teaches me that rarely, if ever, have mistakes been traced to this cause. I find that in the majority of cases the origin of telegraphic blunders can be traced either to want of proper judgment, fine discrimination, or quick perception on the one hand and "poor Morse," whether the letter was an A, B, or C, on the other. Hundreds of operators are to-day pounding away at the "Art," who have no more business to touch a key than a mule has to attend a constitutional convention. Morse's alphabet *cannot* be misconstrued, or misapplied. At least such is my opinion after having received from three to five hundred messages in twenty-four hours, day in and day out, during the late rebellion, from operators who took pride in their business, and who made "Morse" fly over the wires as correctly as it is given *every* beginner to learn from printed characters. Mistakes were few and far between in those days, although the rapidity of transmission then would make a fair operator's hair curl to-day. We had to make the best of our time then, as the Company only owned one wire where now they have five.

After looking carefully over the International Alphabet, I find that there will be no time gained by its adoption. And even supposing that an alphabet could be made by which sixty words per minute could be easily transmitted, where are the operators to be found who can write that rapidly ? It makes a pretty lively writer climb to put down thirty-five words per minute.

The change from Morse to any other system would result in untold annoyances, if no blunders. An operator who has been in the habit of writing Morse, would be in continual dread lest he should, in a moment of inattention, sandwich in a Morse letter or two, completely demoralizing the sense of any word where the Morse letters wouldn't fit well. I cannot see why the "Morse" should be changed because the European system is different. What has the alphabet in Europe to do with our system ? It is not used over the cables and cannot be. Morse is Morse all over America, and, to throw in a little patriotism, I don't go in for aping other nationalities, especially when we are so well fixed as at present. It would be no great task to learn this new alphabet, but the difficulty would arise in mixing it with Morse.

In conclusion I would only suggest to all operators: "Strive to write Morse as it is printed, use proper care in the transmission of tangled words; use judgment in sending a knotty message ; keep your minds upon your business *always*, and I'll guarantee that our present system will not be butchered.

C. F. S.

AUGUSTA, GA., March 11, 1873.

To the Editor of the Journal of the Telegraph :

Please give us the number of words in the accompanying message, through the columns of next JOURNAL : "Augusta quiet, unchanged ; Liverpool tending down ; New York nineteen and five-eighths ?"

Answer.—There are eleven words.

AUGUSTA, GA., March 11, 1873.

To the Editor of the Journal of the Telegraph ;

Either there is some obscurity about Rule 9, or nearly all of our offices are wrong in counting the word "New York." I maintain, according to Rule 9, when it is applied to markets, &c., it should be counted as two words. For instance: New York market, three words when applied to the city or State, one word. Please read Rule No. 9 carefully, and let us hear from you. It gives New York as an example.

AUGUSTA.

Answer.—New York is always to be counted as one word, except when it is used to designate a *thing*, The question in this case is, is "New York market" a thing ? We decide that it is, and that it should be counted three words. If the word market was not used in the context, New York would be but one word, even though the application was inferentially the same.

NEW YORK, March 18, 1873.

To the Editor of the Journal of the Telegraph :

I know of an operator being transferred, February 15th, from, we will say, "B" office to "C" office; he was getting sixty-five dollars per month at "B," and was to get the same at "C." Manager at "B" paid him thirty-two dollars fifty cents for half of the month—fifteen days ; manager at "C" paid him thirty dollars eighteen cents, making total amount sixty-two dollars and sixty-eight cents, claiming that he had paid the former operator the balance for fifteen days. The operator commenced at "C" the 16th, therefore putting in full time. Now, should he not have been paid accordingly ? I have talked with a number about it, and they all think he ought to have full pay ; but we cannot convince the manager at "C" that the operator should. By answering this question you will greatly oblige,

"G. J."

Answer.—The manager at C was right in paying $30.18 for thirteen days' service, at the rate of sixty-five dollars per month. The manager at B should have allowed $34.82 for the fifteen days he was at that office. This, of course, applies to the month of February.

ORRVILLE, O., March 25th, 1873.

To the Editor of the Journal of the Telegraph :

Would it not be well to instruct operators and clerks when taking in a message to make inquiry as to where the person addressed is to be found? The lines are constantly burdened with office messages, stating that "John Smith lives five miles in the country, how shall we deliver?" These are generally death or sickness messages, and are frequently delayed several hours in waiting for a delivery guarantee.

W.

Answer.—Receivers of messages have frequently been instructed that it is their duty to obtain full directions upon every message. Managers should see that receivers understand the importance of this matter.

OPELIKA, ALA., March 22, 1873.

To the Editor of the Journal of the Telegraph :

The JOURNAL of March 15th just received, and in which there are articles regarding the Morse alphabet and a change therefrom. I beg leave, also, the privilege of saying that, although we have been accustomed to the present one from the beginning, and it might be an arduous task for some of the old hands to adopt a new alphabet, yet, if it be better, let us have it at once, so that we can learn it and practice it during the present year, and be ready to adopt it as a whole when '74 swings into line.

O. P. LIKA.

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COWAN, Tenn., Feb. 28th, 1873.

To the Editor of the Journal of the Telegraph:

Why do two cups of Callaud battery used as local to work one sounder consume more sulphate of copper and zinc than ten cups of same kind used as a main on twenty miles line with three offices?

The main will work well about six months without being taken down or any attention except to supply the evaporation with soft water. On the other hand, it becomes necessary to supply the local with sulphate of copper and clean the zincs once in every ten days.

What is neeessary to make the local as constant and as easily kept up as the main?

J. M. STEWART, Manager.

Answer.—The consumption of zinc and sulphate of copper in a battery is inversely proportionate to the resistance of the circuit in which the battery is worked. This resistance being much less in the local than in the main, the consumption in the former is greater than in the latter.

E. S. CARL LEE.—There is no play called the "Telegraph Scene." Boucicault's drama, "The Long Strike," contains a scene which is popularly known by that name.

GEO. H. HAMMOND.—The effect produced upon telegraph wires by lightning and by auroral currents is the same as that produced by a battery, except that the currents are of greater tension. If these currents were regular and steady there would be no trouble in utilizing them. Long circuits have frequently been operated with auroral currents. The atmosphere at all times contains more or less electricity. The origin of thunderstorms is very imperfectly understood. All ideas upon the subject are merely theoretical.

J. M. S.—The kind of battery referred to by Duplex in the JOURNAL of Feb. 15th, represented as working thirteen sounders, was probably the form ordinarily used. The effect under the conditions mentioned would be the same in any form.

OPERATOR, K.—There is always a consumption of *materiel* going on in a battery, of course greater when in action than when the poles are separated. There is no way by which this waste can be prevented. A main line sounder will work well without a relay upon a line 2½ miles in length. The cost of such an instrument is not materially greater than that of the ordinary local sounder.

E. H. WALKER.—There is no battery called the Morse Local Battery. The Daniell is the form generally used for local purposes. There is no patent upon any portion of this battery. Various modifications and improvements have, however, been patented. Porous cups are made in the same manner as ordinary unglazed earthenware.

Q.—Algebra is employed in calculating measurements in electrical problems, because it is the easiest and most simple way to arrive at a result, but it is not essential. The Duplex system doubles the capacity of a wire in transmission of messages by allowing two different messages to be sent at the same time. That is, a message may be going from New York to Chicago at the same time that one is being sent from Chicago to New York, upon the same wire. Nothing, however, is saved in labor, two operators being required at each end of the line, one to receive and one to send. We shall be glad to assist you in your efforts to acquire a greater knowledge in the telegraphic art. Don't be afraid to ask for information.

D. H. Youngs.—Your paper is mailed regularly. If you do not receive it it is the fault of the postal service, for which we are not responsible.

H. H. Pierce.—See answer to D. H. Youngs.

FOREIGN TELEGRAPHIC ITEMS

THE demand for shares of the New York, Newfoundland, and London Company has been in advance of the supply, owing to the fact that—in anticipation of the amalgamation with the Atlantic companies—a scheme is in preparation for the separation of the land rights from the telegraphic concession of fifty years, and developing them for the benefit of the shareholders; and it is anticipated that they will represent a bonus equal to £4 per share to the holders of the Newfoundland shares.

THE report of the Telegraph Construction and Maintenance Company, submitted to the meeting on the 11th inst., shows a net profit for the year, including £10,481 brought from last account, of £79,945, of which £22,410 has been absorbed by the payment of an interim dividend of 5 per cent., and a further distribution of £1 4s. per share is recommended, making a total of 15 per cent, free of income tax, leaving £12,715 to be carried forward. The report was adopted.

THE cable for the duplicate French Atlantic line from Land's End to New Nork, *via* Halifax, will be submerged during the Summer; the Eastern Telegraph Company's duplicate cable, between Porthcurno and Lisbon, touching at Vigo, will be laid in June; and a contract has been entered into for manfacturing 3,866 miles of cable, to be submerged between Portugal and Brazil in 1873 and 1874.

THE West India and Panama Company have now resolved to complete the system from Jamacia to Colon, and to put into an effective condition the whole of the cables, and arrangements are now in progress with the Telegraph Construction Company for effecting these objects.

THE annual meeting of the shareholders of the Indo-European Telegraph Company was held Feb. 28th, the Hon. Robert Grimston presiding. The chairman said he had hoped that they would be able to share a dividend, but they had found that cheap maintenance was synonymous with bad maintenance. In February of last year the lines were working well, and continued to do so throughout the months of March and April, but in the following months the lines broke down, and he found that when they had once lost their customers they had great difficulty in getting them back again; and since July the rate had been reduced by the Telegraphic Convention at Rome from £4 10s. to £4. By this they had lost more than 4s. on every message, or one-eighth of their total revenue, without any corresponding advantage.

THE traffic returns on the Great Northern Telegraph Company's lines for the month of February were as follows:—European lines: February, 1872, revenue, 92,242 francs; February, 1873, revenue, 87,398 francs; China and Japan lines, February, 1872, revenue 82,998 francs; February, 1873, revenue 79,230 francs. In Europe the Danish-Russian cable has been interrupted from the 1st to the 22nd of February. In China the Hongkong-Shanghai cable was interrupted at the beginning of the month, and not restored until the 22d of February, when the Amoy station was simultaneously opened.

A COMPANY has been formed under the title of the Black Sea Telegraph Company, for the purpose of laying a submarine cable from Odessa to Constantinople, under concessions from Russia and Turkey. The chairman of the board will be Mr. C. F. Tietgen, chairman of the Great Northern Telegraph Company; and the directors are Mr. H. G. Erichsen, Mr. F. Daniel Gooch, Mr. Spencer Chapman, and Mr. Philip Rawson.

THE prospectus of the DirectUnited States Cable Company has just been issued at London. The capital is £1,300,000, in 65,000 shares of £20 each. The cable, which is to connect Ireland with a point on the New Hamshire coast, will be made by Messrs. Siemens; the contract price for manufacturing, laying, and maintenance for thirty days afterwards, being £1,211,000. The shares are now at ¾ to 1¼ premium.

THE report of the India Rubber, Gutta Percha, and Telegraph Works Company has been issued. In addition to completing contracts for Her Majesty's Government, the company has manufactured and delivered a cable during the year for the River Plate Company, and has made and laid a cable from England to Spain for the Direct Spanish Telegraph Company. The company is now engaged in manufacturing the third cable for the International Ocean Telegraph Company of New York, with which the *Dacia* will shortly proceed to Havana for the purpose of laying.

THE number of messages sent by telegraph between England and India, and India and England, in August last, was 3,266, which is nearly the monthly average. The bulk went by the Red Sea, viz., 2,298; of the rest, 808 were sent by Teheran, and 160 by Turkey.

THE total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ending the 22d of February, 1873, and during the corresponding week of 1872 is, February 22d, 1873, 297,679; February 24th, 1872, 243,016; increase this year 54,663.

The following is a statement showing the total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ended the 1st of March, 1873, and during the corresponding week of 1872:—Week ended March 1, 1873, 301,131; week ended March 2, 1872, 235,259. Increase in the week of 1873 on that of 1872, 65,872.

THE Eastern Telegraph Company have declared an interim dividend of 3s. per share for the quarter ended the 31st of December, payable on the 15th of March.

THE Mediterranean Extension Telegraph Company report the usual half-yearly dividend on the 8 per cent. Preference Stock, less income-tax, and a dividend equal to 3 per cent. per annum on the ordinary share capital, free of income tax, both payable on the 1st of March, subject to the receipts from Italy of the remittance expected, leaving a balance of £688, to be carried to the reserve fund.

The Telegraph Construction and Maintenance Company has declared a dividend of £1 4s. per share. Much disappointment is felt by the shareholders, as double the amount was expected, and the shares declined considerable in consequence.

THE traffic receipts of the Eastern Telegraph amounted for the month of February to £30,284, and for the corresponding month of last year to £31,207, showing a decrease of £923.

AUSTRALIAN advices state that the question of subsidising the Australian cable is not yet finally decided.

AT the meeting on Tuesday of the Submarine Telegraph Company, the report of the directors announcing a dividend for the half year at the rate of 15 per cent. per annum was adopted.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
April 1, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Jacksonville, Ala., re-opened.
Boca, Cal., closed.
Bridgeport, Cal., closed.
Gallatin, Cal., closed.
St. Francisville, Ind., closed.
Strawberry Point, Iowa, changed to Enfield.
Kittery, Me., closed. Business will be delivered from Portsmouth, N. H.; charges for delivery, 15 cents.
Plympton, Mass., closed.
Barnett's, Mich., changed to Shelby, Oceana Co.

The rates given below for offices in Minn. (see list of Minn. offices in the tariff book) are the rates for other lines from La Crosse, Wis., and should be added to the rate to that office. Check business for these offices to Chicago, Ill.

Albert Lea,	55 and	4
Alden,	55 "	4
Brownsdale,	50 "	4
Delavan,	60 "	4
Fountain,	40 "	3
Grand Meadow,	50 "	4
Hokah,	25 "	2
Houston,	30 "	2
Lanesboro,	40 "	3
Oakland,	50 "	4
Rushford,	35 "	3
Spring Valley,	45 "	3
Wells,	60 "	4
Whelan,	35 "	3
Winnebago City,	65 "	4

Business for Kingston, N. J., will hereafter be checked to Monmouth Junction, N. J., instead of Bordentown.
Neshanic, N. J., closed.
Chautauqua Station, N. Y., changed to Moon's.

Messages may be taken for Berlin Heights, O., to be delivered from Ceylon, O.; charges for delivery, 10 cents.

Corvallis, Or., re-opened.
Langdon's, Pa., closed.
Yatesville, Schuylkill Co., Pa., re-opened.
English Camp, W. T., closed.

Hereafter the "tariff for other lines" to Freeport, Port Blankly, Port Gamble, Port Madison, and Port Townsend, W. T., will be 50 †25 from Seattle, W. T.; check San Francisco, Cal.

† Each additional five words or less.

* La Crosse, Wis., is now a W. U. office and should be checked direct square 190. Present rates not to be increased.

NEW OFFICES.

376 Mumford, Ala.
267 Tuskegee, Ala.
258 Georgetown, Ga.
329 Caledonia, Pulaski Co., Ill.
329 Foreman Sta., Ill.
310 Middletown, Ill.
335 Rock City, Ill.
271 Cutler, Ind.
261 Milford, Ind.
261 Silver Lake, Ind.
289 Veedersburg, Ind.
376 Enfield, Iowa.
530 Fort Dodge, Kansas.
530 Petersburgh, Kansas.
223 Mt. Sterling, Ky.
243 Winchester, Ky.
18 Bealey's Station, Mass., check New Bedford, Mass.
200 Armada, Mich.
231 Riga, Mich.
269 Shelby, Oceana Co., Mich.
231 Ottawa Lake, Mich.
190 La Crescent, Minn.
190 Southern Minn. Junction, Minn.
* Isinours, Minn., 40 and 3 more than La Crosse, Wis., check Chicago.
* Hayward's Minn., 55 and 4 " " " "
Chicago.
* Wykoff, Minn., 45 and 3 " " " "
Chicago.
388 Arabela, Mo.
369 Cheltenham, Mo.
388 Clark City, Mo.
388 Downing, Mo.
388 Luray, Mo.
408 Lancaster, Mo.
388 Memphis, Mo.
418 Wakenda, Mo.
12 Dayton, N. J., check Monmouth Junc., N. J.
41 Wortendyke, N. J., check Godwinville, N. J.
139 Moon's, N. Y.
233 Amelia, O.
181 Lower Salem, O.
130 Kinzue, Pa.
151 Noblestown, Pa.
130 Pittsfield, Warren Co., Pa.
131 Parnassus, Pa.
* Bonham, Texas, 85 5 470 Marshall, Tex.

OFFICES HAVING "SPECIAL SHEET A."

Will hereafter check Williamsport, Milton, 45 cents; Danville, Rupert, and Catawissa, Pa., 40 cents more than special rate to Philadelphia, Pa. Present rates must not be increased.

Half-rate messages may be taken for and received from Bonham, Texas.

In Supplement to JOURNAL, March first, the following corrections in West Virginia should be made: Charleston, Kanawha Co, Coalburg and St. Albans are not closed.

Alderson should read: { 65 4 203 Huntington, W. Va.
{ 35 2 133 Greenbrier, W. S. Spgs.

ATLANTIC CABLE.

REDUCTION OF RATES.

On and after May 1st, 1873, the tariff for Atlantic cable messages will be as follows:

TARIFF OF RATES, PAYABLE IN GOLD, TO ALL POINTS IN GREAT BRITAIN, IRELAND AND FRANCE.

NOTE.—The 10 word minimum on business to or from Great Britain and Ireland is abolished.	*To Great Britain and Ireland.*	*To France.*	
	For each word.	*For ten words or less.*	*For each word over ten.*
From New York City, and all points in Nova Scotia, New Brunswick and New England States	.75	$7.50	.75
From all points in New York (except New York City), New Jersey, Pennsylvania, Delaware, Maryland and District of Columbia	.78	7.80	.78
From all points in Virginia, West Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, Tennessee, Kentucky, Ohio, Indiana, Illinois, Michigan and Wisconsin, from St. Louis, Mo., and from Western Union Company's offices in Florida	.90	9.00	.90
From all points in Texas, Arkansas, Missouri (except St. Louis), Kansas, Nebraska, Iowa, Minnesota, Colorado, Dacotah, Wyoming, New Mexico, Utah, Idaho, Montana, Nevada, California, Arizona, Oregon and Washington Territory	1.00	10.00	$1.00
British Columbia	1.10	11.00	1.10

Note.—Rates to points beyond London and France will be computed by adding to the reduced rate to France after May 1st.

Messages for Egypt, addressed "via Malta," will be charged for as follows:

	Not exceeding 10 words.	*Not exceeding 20 words.*
Alexandria	$5.00	$7.50
Cairo and Suez	5.62	8.50
Suez Canal and Isthmus of Suez	5.62	8.50

Half the 20 word rate to be charged for every additional 10 words, or fraction thereof, above 20 words.

WILLIAM ORTON,
President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
New York, March 26th, 1873.

On and after April 10th, money order offices will be established in the following named points in C. O. Rowe's district:

BUTLER, Pa.
FOXBURG, "
GREECE CITY, "
ST. PETERSBURG, "

G. H. MUMFORD,
Vice-Pres't.

EXECUTIVE ORDER.—No. 146.

NEW YORK, March 20th, 1873.

All messages covered by stamps will hereafter bear the word "stamp" in the check. In transmitting a twelve word message, for example, the check will be 12 D. H. stamp. Where the reply is covered by stamps attached to the original message, under the rule the check will be 12 D. H. stamp 33. *No replies to stamped messages will be sent free unless the signal 33 is contained in the check.*

G. H. MUMFORD,
Vice-President.

ANOTHER CABLE.

A company is organizing in London for the purpose of laying a cable from the coast of Ireland to a point on the coast of New Hampshire, where it is to join the wires of the land telegraph. A contract has been entered into for the manufacture of the cable, which will be 3,000 miles in length, will cost $6,055,000, and is to be completed early in 1874. The prospectus states that Anglo-American stock is now at 60, and French Atlantic at 50 per cent. premium. It is estimated that if the Company charges only 42 cents per word, it will realize 15 per cent. on its capital of $6,500,00. The members of the Council in New York are Mayor Havemeyer, Messrs. H. G. Stebbins, P. C. Calhoun, Henry Clews, P. N. Spofford, Edward Haight, John Duff, James W. Brown, and E. A. Straw.

THE River Plate and Brazil Telegraph Company (whose prospectus has just been issued) have recently obtained exclusive privilege for forty years from the Brazilian Government for a submarine cable to connect Rio de Janeiro with Uruguay, where the line will join that of the Monte Videan and Brazilian Telegraph Company, and thus establish through communication with the principal cities of the River Plate, whence, by the Transandine land line, there is already direct telegraphic intercourse with the Pacific at Valparaiso. The cable is in course of manufacture by Messrs. Seimens, and is to be laid by the 15th of August next, and within about ten or eleven months of that date the completion of the line of the Brazilian Submarine Company will place the whole system in communication with Europe.

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TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKNOWLEDGMENT OF RECEIPTS FOR ASSESSMENTS TO MARCH 26th.

The acknowledgment of receipt of any assessment is to be understood as an acknowledgment for all previous assessments.

ASSESSMENTS 37 & 38.

31	89	98	121	136	139	154	156	158	160	164
171	182	199	232	248	256	271	273	288	328	330
333	351	360	376	418	428	429	447	490	494	495
496	497	499	500	503	504	505	506	507	546	549
561	565	573	659	690	692	723	724	728	730	732
733	743	780	801	823	871	897	954	955	956	957
958	959	960	963	964	977	979	1042	1048	1098	1099
1104	1109	1139	1187	1193	1194	1208	1211	1213	1221	1234
1335	1266	1268	1269	1274	1275	1375	1379	1380	1399	1416
1421	1428	1495	1496	1497	1499	1573	1576	1596	1618	1638
1667	1674	1675	1676	1677	1696	1712	1718	1730	1742	1743
1744	1765	1766	1767	1777	1782	1783	1784	1787	1788	1789
1801	1802.									

ASSESSMENT No. 39.

64	121	312	316	323	333	344	372	380	463	508
509	564	575	576	587	622	636	662	729	855	856
870	916	917	939	1006	1046	1066	1182	1198	1251	1260
1329	1499	1553	1593	1594	1610	1620	1666	1678	1699	1742
1803	1813	1818	1819	1820	1821	1825	1826	1827	1828	1829
1830	1831	1832	1833	1834	1835	1836	1837	1838	1839	1840
1841	1842	1843	1844	1845	1846	1847	1848	1849	1850	1851
1852	1853.									

ASSESSMENT No. 40.

2	28	107	188	289	302	346	371	447	464	549
555	661	676	858	859	883	923	932	1008	1126	1245
1489	1515	1571	1645	1735	1736	1854	1855	1856	1857	1858
1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869
1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880
1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891
1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902
1903.										

ASSESSMENT No. 41.

13	16	23	53	60	88	98	108	131	157	199
208	211	217	271	277	286	301	341	349	351	553
600	615	659	715	721	722	742	943	1147	1154	1169
1191	1208	1252	1266	1300	1306	1357	1394	1398	1429	1484
1516	1587	1623	1725	1904	1905	1906	1907	1908	1909	1910
1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932
1933	1934	1935	1936	1937	1938	1939	1940	1941.		

Too late for announcement in the JOURNAL of the 15th ulto., came the notice of the death of H. Frank Thurber, which occurred at Stevenson, Ala., March 13th. He was drowned on that morning in the little spring branch running through the town. He was walking leisurely on the bank of the stream, and was seen by three ladies to suddenly throw up his hands, turn around two or three times, and then fall into the stream face foremost. The ladies ran to him; his feet and legs were on the bank, and his chest and face in the water. They pulled him out, and he struggled two or three times as if strangled, and then died. The Coroner's jury declared that he was taken with syncope, and falling into the water was unable to extricate himself. Mr. Thurber was for many years an operator at 145 Broadway, New York. He leaves a wife and brother in New York. His father, Dr. Thurber, lives in Oswego, N. Y. His body was taken charge of by the Masons, of which order he was a member.

Mr. Thurber was employed as operator down to a year previous to his death, in the office at 145 Broadway. He was one of the founders of the Association and was well known throughout the country.

THOMAS D. WHIPPLE, operator at Hightstown, N. J., desires information regarding the widow of J. J. Walker, who was formerly line repairman between Council Bluffs and Clinton, Iowa. She is supposed to reside somewhere in Michigan.

The present address of Harry West is wanted.

Mr. West was a member of the U. S. M. Telegraph Corps, Department of the Cumberland, and was stationed for a time at Christiana, Tenn.

Will some friend give the desired information through the JOURNAL.

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

DELINQUENT LIST.

Delinquent members will find a statement of their standing with the Association below. Those in arrears for assessments 34, 35, and 36, will be required to fill out a restoration blank, have it properly approved by an agent *or officer* of the Association.

ASSESSMENTS DUE.

Nos. of Certificates.			*Nos. of Certificates.*		
21	38	inclusive.	43	37 to 38	inclusive.
49	34 to 38	"	90	36 to 38	"
150	34 to 38	"	162	34 to 38	"
169	37 to 38	"	178	37 to 38	"
192	34 to 38	"	225	37 to 38	"
233	34 to 38	"	389	34 to 38	"
412	37 to 38	"	431	37 to 38	"
454	34 to 38	"	534	37 to 38	"
597	37 to 38	"	623	37 to 38	"
652	37 to 38	"	660	37 to 38	"
744	37 to 38	"	800	37 to 38	"
801	37 to 38	"	817	34 to 38	"
874	38	"	896	34 to 38	"
934	37 to 38	"	946	34 to 38	"
1039	37 to 38	"	1069	37 to 38	"
1142	34 to 38	"	1170	37 to 38	"
1178	37 to 38	"	1180	37 to 38	"
1209	37 to 38	"	1242	37 to 38	"
1265	34 to 38	"	1270	37 to 38	"
1296	34 to 38	"	1332	37 to 38	"
1335	34 to 38	"	1361	37 to 38	"
1367	37 to 38	"	1378	37 to 38	"
1381	34 to 38	"	1388	37 to 38	"
1396	34 to 38	"	1408	37 to 38	"
1434	37 to 38	"	1445	37 to 38	"
1446	37 to 38	"	1452	37 to 38	"
1459	34 to 38	"	1461	37 to 38	"
1462	37 to 38	"	1467	37 to 38	"
1480	34 to 38	"	1493	34 to 38	"
1509	37 to 38	"	1538	34 to 38	"
1548	37 to 38	"	1550	38	"
1561	34 to 38	"	1594	37 to 38	"
1588	37 to 38	"	1595	38	"
1609	37 to 38	"	1631	34 to 38	"
1624	34 to 38	"	1637	37 to 38	"
1638	34 to 38	"	1652	37 to 38	"
1659	34 to 38	"	1668	34 to 38	"
1679	37 to 38	"	1683	38	"

DEEP-SEA TELEGRAPHS.

It appears from recent statistics that, with the exception of the Atlantic lines, deep-sea telegraphs do not "pay." The list of dividend-paying companies is a very short one, including only five lines out of an aggregate of fifty—namely, the Anglo-American, French, Eastern, Cuban, and Chinese. The Anglo-American and French lines pay 12 per cent.; the other four, less than 5 per cent., on an aggregate capital of $20,000,000. The London *Economist*, citing these facts, and quoting from Sir James Anderson's pamphlet on the same subject, explains the reasons for the lack of profit. As distance increases, social messages diminish, and the majority of the companies are thus limited to news and business despatches, for which high prices are charged. The Eastern Company suffers from the competition of the land lines to India, which are not very profitable enterprises, and on almost all points, as far East as Alexandria, it is also exposed to the competition of various European lines. One of its latest antagonists is the Direct Spanish Telegraph Company, which is also a submarine undertaking in active operation, though it has not been so long enough to test its profits. The *Economist* prophesies that as $5,000,000 are more than enough to make and lay a new Atlantic Cable, capable of clearing 10 per cent. per annum, it is almost certain that there will be a competitor for a third or fourth share of the net $2,000,000 per annum which Atlantic telegraphy yields. Amalgamation of companies, however, is the order of the day, and in the event of a general combination there can be no successful competition.

THE TELEGRAPH IN RUSSIA.

In January, 1869, the number of telegraph stations throughout Russia was 380, and the number of telegrams despatched in the empire of the Czars in 1868 was 1,491,834. In January, 1872, the number of Russian telegraph stations had increased to 648, and from these offices 2,860,649 telegrams were despatched during 1871.

THE TELEGRAPH IN WESTERN AUSTRALIA.

Progress is being made with a telegraphic line between Perth, Western Australia, and Albany, King George's Sound. A line from Perth to Bunbury is to be extended as far as Bassetton, the port and principal town of the Vasse district in Western Australia, and a new line from Newcastle to Geraldton, Champion Bay, is to be commenced in a few weeks. The jarrah posts for this line are to be supplied at a cost of £19 9s. per mile, by Messrs Smith and Nunan; the former of these gentlemen constructed the line to Bunbury.

THE TELEGRAPH IN NEW ZEALAND.

A return, as to the length of telegraphs existing in New Zealand, shows that in 1871 that colony had 3,286 miles of line. In 1870, the corresponding length was 3,162 miles; in 1869, 2,777 miles; in 1868, 2,637 miles; in 1867, 1,447 miles; and in 1866, 1,398 miles.

CONCESSION FOR CABLE COMMUNICATION WITH THE UNITED STATES.

The Portuguese Minister of Public Works has asked the Cortes to ratify a concession for a cable between Portugal and the United States, touching at the Azores. The contract for laying the cable has been signed.

BLASTING BY ELECTRICITY.—The *Aberdeen Free Press* says: On Monday a further experiment was made with electricity as a means of firing blasting charges in Mr. Fyfe's quarries at Kemnay. A huge breast of rock, calculated to weigh about 2,000 tons, was bored in eleven places, charged and fired almost simultaneously by a current of electricity from a battery which was under the care of Mr. David Wright, electrician, Aberdeen. The huge mass was started with little noise from the report, but with a rumbling sound like that of distant thunder. A second blasting was fired on Tuesday. Although the ground was covered with snow, and a heavy snowstorm was falling, wires extending 1,500 feet in length being laid, and a current of electricity put on, in an instant a tremendous explosion was heard, which shook the ground like an earthquake. Great masses of granite were upheaved in the air, and about 5,000 tons were displaced. It is the largest blast which has ever been witnessed in these quarries, effected by means of electricity applied by a new apparatus most ingeniously constructed.

BORN.

BARNARD.—At Dodson, O., March 3, 1873, to J. E. Barnard, Manager W. U. Tel. Office, a daughter.

CLARK.—At Canal Dover, O., March 17, 1873, to Tom. C. Clark, Manager W. U. Tel. Office, a son.

MEAD.—At Jamestown, Ind., March 20, 1873, to W. S. Mead, Manager W. U. Tel. Office, a son.

MARRIED.

GLASS-PROBASCO.—At Anderson, Ind., March 6, 1873, W. H. Glass, Manager W. U. Tel. Office, Knightstown, Ind., to Miss Mattie Probasco, of Knightstown, niece of Hon. Henry Probasco, of Cincinnati.

POST-LAWRENCE.—At the residence of the bride's father, San Francisco, Cal., March 1, 1873, by Rev. John Kimball, Arthur H. Post, Supt. Supply Dept., Pacific Division, W. U. Tel. Co., to Harriet E. Lawrence.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, APRIL 1, 1873.

FREE BUSINESS NOT COVERED BY FRANKS.

There is no regulation more frequently disregarded than Rule No. 48, which provides that:

"Private messages between employés of the Company must be restricted to those of an urgent social character, and approved by the manager of the office from which they are sent. *Copies of such messages must be regularly checked and returned with other free business.*"

It is not desired to limit the privilege accorded by this rule, but the forms under which these messages should be sent must be strictly adhered to. Every free message, not covered by a frank, must contain in its check the reason why it is sent free. If free by reason of it being stamped, the check should be "10 D. H. Stamp." If free for a superintendent, "10 D. H. Supt." If for a manager, "10 D. H. Mgr.", and for an operator, "10 D. H. Opr."

Managers are instructed, and required to observe, that when a free message is received at their office, to be forwarded or delivered, the check to which does not conform to the requirements of the rule, it is their duty to hold such message, until, by enquiry of the manager of the sending office, the fact is ascertained that the transmission is authorized.

For the fulfilment of this order, managers are responsible, and will be held to a strict account.

In this connection, attention is directed to Executive Order No. 146, which appears on page 134. It relates to the checking of messages and answers thereto, which are covered by stamps.

MANAGERS of offices in returning with their monthly (No. 4) reports, the business done under "red" Franks, should enter such on a separate blank from press or other half-rate messages, and enclose the statements, "Refunded under Executive Order, No. 127." All such messages should bear on their face the amount of tolls, at full rates, and the number of rank on account of which one-half of the (full) tolls is refunded.

SERVICE messages of Commercial News Department, such as enquiries as to errors in, and for missing, or delayed reports, and answers thereto, should be considered as office messages. All others should be reported, and returned with free message reports.

THE INTERNATIONAL MORSE ALPHABET.

For general information, we give herewith the form of alphabet which is used by telegraphers in every country except America. This form originated with the Germans, who have carefully studied the subject, and so arranged the alphabet that the letters which are most frequently used contain the shortest signals. Each of the figures are composed of five elements, systematically arranged, the first half checking the second, and so rendering them as free from ambiguity as they are easy of recollection by the mind. There are thirty-two characters in the alphabet, those in addition to the ordinary twenty-six being necessary to cover peculiarities in the French, German and Spanish languages.

A	·—	V	···—
B	—···	W	·——
C	—·—·	X	—··—
D	—··	Y	—·——
E	·	Z	——··
F	··—·	Ch	————
G	——·	Ä	·—·—
H	····	Ö	———·
I	··	Ü	··——
J	·———	É	··—··
K	—·—	Ñ	——·——
L	·—··	1	·————
M	——	2	··———
N	—·	3	···——
O	———	4	····—
P	·——·	5	·····
Q	——·—	6	—····
R	·—·	7	——···
S	···	8	———··
T	—	9	————·
U	··—	0	—————

Period (.)	····——
Comma (,)	·—·—·—
Query (?)	··——··
Exclamation (!),	——··——
Apostrophe ('),	·————·
Hyphen (-),	—····—
Fresh paragraph,	·—·—·
Inverted commas,	·—··—·
Parenthesis,	—·——·—
Understand,	···—·
Wait,	·—···
Erase,	·····
Call signal,	—·—·—·—
End of message,	·—·—·—
Cleared out all right,	·—···—·—·
I don't understand,	··——·····——··

The accented é is important in French to distinguish between the past participle and the present tense. The apostrophe is equally necessary in French, thus: C'est, l' intention, de l' Empereur, &c.

The ä ö ü are important in German.

The Spanish ñ is seldom used.

The period (.) is generally written in three pairs, the mind counting 3 more easily than 6, thus:

·· ·· ··

The erasure is frequently divided into 3 threes, and for the same reason. Thus:

····· ····· ·····

It is used as follows:

Suppose the operator to have mispelled a word, he gives the nine dots (the erasure signal), goes back to the word before the error, repeats it, and continues.

PROGRESS OF THE ELECTRIC TELEGRAPH IN AMERICA.

The progress of the Electric Telegraph upon the American continent is only to be traced through the operations and the record of the many companies which have existed under its name. Despite the discouraging checks and deterring obstacles occasioned by the want of success in business management, and the limited experience of those who controlled the early organizations, the march has been steadily onward. So closely has it become identified with the necessities of almost every business interest, and the facility with which it is adapted to many services, enhancing human comfort and welfare, that at this day he would be bold indeed who would undertake to set a limit to its power and capacity.

During the first few years after the introduction of the electric telegraph into this country, its progress was very slow and its future success doubtful. The first line was constructed between Washington and Baltimore in the Spring of 1844, through aid furnished by Government; but the results of its operation were so unsatisfactory that the Postmaster-General, in his report for 1845, expressed the opinion that the revenue could not be made to equal the expenditures under any rate of charges which might be adopted. As the Government declined to assume the ownership and control of so doubtful an undertaking, the inventor had no recourse but to appeal to the enterprise of the people for the means required for its development. Capitalists, however, were slow to invest in a scheme so novel and precarious, and, as a natural consequence, there was great difficulty in obtaining funds wherewith to build lines. Companies were, nevertheless, organized in various parts of the country, and lines were built in detached sections between the more important places, but without any general plan of coöperation.

The invention of the letter-printing telegraph by Mr. House, in 1846, and the introduction of the electro-chemical telegraph of Mr. Bain into this country, in 1849, however, greatly facilitated the construction of competing lines.

The first line operating under the House patent was completed in March, 1849, from Philadelphia to New York City. The line of the Commercial Telegraph Company between Boston and New York, using the same patent, was completed in the autumn of the same year, and was followed by one from New York to Buffalo, and subsequently to St. Louis and Chicago.

During the year 1849, which was very prolific in the production of competing lines, the Bain patent was introduced upon lines extending between New York and Buffalo, and New York and Washington,

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and, in the succeeding year, upon lines extending between Boston and Montreal, Boston and Portland, and Boston and New York.

In 1851 there were seven Bain lines in operation in the United States, having over 2,000 miles of wire; eight House lines, having 3,000 miles of wire; and sixty-seven Morse lines, having 20,000 miles of wire. In the autumn of this year, the Morse and Bain lines between New York and Washington were consolidated; and in the succeeding Spring the Morse and Bain lines between New York and Boston were united under one company. The union of these lines was followed by that of the New York and Buffalo Morse and Bain lines, and subsequently by those of the House lines between these points. The consolidation of these lines was a step in the right direction, as it increased the receipts and lessened the expenses of the companies, while it enabled them to do the business better, by possessing greater facilities. Still, the great number of separate organizations remaining throughout the country prevented that unity and despatch in the conduct of the business so essential to its success. Under these circumstances, the public failed to realize the brilliant thought of instant communication between distant points.

The lines in the South and West were undergoing a similar experience to those in the East. One only, the Magnetic Company, with wires from New York to New Orleans, on the seaboard route, was barely paying expenses, the others all being operated at a loss. At the then existing rates of tariff, there was, probably business sufficient to maintain one company upon each route, but upon every route competition was always found, and the division of business was ruinous.

It was at this period that a few clear-sighted men in the West conceived the project of buying up the groups of feeble organizations, and making them direct leaders between the larger Western cities. The stock of the existing companies was of little value, and was easily and cheaply secured. An act of incorporation was obtained from the State of New York, and in April, 1851, an organization was effected under the name of the New York and Mississippi Valley Printing Telegraph Company, for the purpose of building a line from Buffalo, N. Y., to St. Louis, Mo. This was the origin of the present Western Union Telegraph Company—of the splendid system of telegraphs which so nearly approaches perfection as to seem almost marvelous.

During the next six years this Company acquired, by purchase, lease or consolidation, all of the lines which were being operated in the section of country bounded by Buffalo, Chicago, St. Louis and Pittsburgh, with the exception of the Atlantic and Ohio Telegraph Company's wires. In all this time the surplus earnings were devoted to the construction of new wires within their territory, and in the improvement of the old.

In April, 1856, by an Act of the New York Legislature, the name of the New York and Mississippi Valley Printing Telegraph Company was changed to that of the Western Union Telegraph Company. In May, 1856, this company acquired the Pittsburg, Cincinnati and Louisville lines; in July, 1857, the Southern Michigan line; and in December, 1863, the New York, Albany and Buffalo lines; in April, 1864, the Atlantic and Ohio lines; March, 1864, the Pacific Company's lines; in August, 1864, those of the Alleghany Company and the line of the Ithaca Company. Their wires across the plains and over the Rocky Mountains to California was completed in 1862.

At the East and South, the American Telegraph Company, organized in 1855, followed a similar course, and ultimately controlled lines extending throughout the Atlantic seaboard and Mississippi Valley. This company had purchased the line of the Commercial Telegraph Company, better known as the House line, between New York and Boston, and acquired, by lease, the control of the lines of the Maine Telegraph Company, extending from Boston to Calais, Me., and those of the Nova Scotia Telegraph Company, connecting Calais with Halifax. In 1859 consolidation was effected with the New York and Washington House Printing, the Magnetic, and New York and New England Union. It also acquired possession of the Troy and Canada Junction, Long Island, St. John and Frederickton, and Richmond, Charlotteville and Staunton lines; and subsequently those of the Cape Cod, Cape Cod Marine, Vermont and Boston, Lynchburg and Abingdon, East Tennessee, Delaware and Hudson, Philadelphia and Wilkesbarre, Susquehanna, Baltimore and Ohio, Washington and New Orleans, and Southwestern Telegraph Companies' lines. The American Company, in short, had followed in the Eastern and Southern sections of the country a similar course to that pursued by the Western Union Company in the West; and by purchase, consolidation and construction, controlled lines extending throughout the Atlantic coast and the Mississippi and Ohio Valleys.

These two companies, working in connection and harmony, covered the entire area of the United States, and performed the business of telegraphing better than it had ever been done before.

In 1863 the United States Telegraph Company was organized, and constructed a system of rival lines, embracing sixteen thousand miles of wire, and covering considerable portions of the territory occupied by the Western Union and American lines. The United States Company, however, under the most vigorous administration, with all of its lines new and worked to their utmost capacity, was unable to meet its current expenses—the net loss, during the last year of its operation, amounting to an average of more than ten thousand dollars per month.

In April, 1866, the lines of the United States Telegraph Company were consolidated with the Western Union, and, on the 1st of July following, the lines of the American Compauy were brought under the same management.

The numerous consolidations of lines throughout the country which have been going on almost uninterruptedly for over fifteen years, had now resulted in a complete unification of the great majority of the telegraph lines in the United States, and rendered the system the most extensive and efficient in the world. No monopoly of the business, however, was obtained. The Morse patent having expired, and no exclusive privileges being granted by either State or national governments, the construction and operation of telegraph lines within the jurisdiction of the United States remained freely open to all.

From this time dates a new era in the business of telegraphing on this continent. The enormously increased facilities given to the public became rewarded by a proportionate increase of traffic. Many reforms in the manner of conducting the service were introduced, among them direct working between far distant points, thus saving the time incurred by the frequent repetitions which heretofore had been thought necessary, and proportionately decreasing the labor and cost of transmission. A new impetus was afforded for developing improved machinery for operating the lines, the consolidated companies having both the will and the means to afford aid in that direction, which assistance could not have been given with the same effect under the old arrangements.

Telegraphy, since 1866, has made a great advance. It has leaped, as it were, from the condition of doubt and indecision, into the full knowledge of its strength and capabilities.

In a future article we will endeavor to record its progress during the past six years.

The Postmaster-General has secured for the "fountain of his telegraphic knowledge" a Governmental appointment as *artisan* to visit the coming Exposition at Vienna. The "American gentleman residing in Paris"—he of the wonderful statistics—having been appointed Honorary Commissioner for the same purpose, it is likely that an overwhelming mass of figures and information will be cooked up for operation upon Congress next Winter. This party, however, is incomplete without the "estimate" man. How came he to be overlooked?

The New York *Tribune*, in commenting upon the contemplated reduction in rates by the Western Union Telegraph Company, which was announced in the Journal of March 15th, after some speculative theories as to the cause, remarks as follows:

"Should this prove true, the reduction in the tariff may well be described as of 'the most radical and sweeping nature.' At any rate, the proposed action of the Western Union Telegraph Company is one of the strongest arguments against a Government postal telegraph. Cheap and accurate telegraphing can only be attained by healthy competition, by thoroughness and economy in management, and by the prompt adoption of the latest scientific discoveries. Can we expect these from a Government bureau?"

Mr. George H. Bliss, Superintendent of the lines of the Chicago and North-Western Railroad Company, has resigned. He is succeeded by Mr. Geo. H. Thayer, who, for the past nine years, has been Chief Operator in the General Office of that Company in Chicago. Mr. S. E. French takes the position made vacant by the promotion of Mr. Thayer.

G. H. Bliss & Co., Chicago, successors to Bliss, Tillotson & Co., advertise in this issue for good workmen.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY.

JANUARY, 1873.

APPOINTMENTS.

Getz, J. L.....Allentown, Pa.
Adams, T. G .....Baltimore, Md.
Sprigg, S. D..... " "
Buckman, J. S.....Bordentown, N. J.
Westbrook, Jno.....Harrisburg, Pa.
Given, Alonzo.....Mifflin, "
Brotherman, W. J.....Newark, N. J.
Keele, A. M..... " "
Bowers, C. H.....Perth Amboy, N. J.
Fondersmith, H.....Philadelphia.
Shrive, J. T..... "
Anderson, J. T..... "
McLaughlin, Jas. M..... Mercht's Exch., Philadelphia.
Riegel, A.....Pottsville.
McCole, James T.....Washington, D. C.
Curran, E.....Wilkesbarre, Pa.
Brower, Hy. J.....Brooklyn, N. Y.
Bennett, W. H.....145 Broadway, N. Y.
McDonald, J. B..... " "
McDonald, J. A. ..... " "
Pease, E. C..... " "
Smith, W. K..... " "
Bonsell, Miss Emma... ..... " "
Gilbert, Miss F..... " "
Hatley, Miss Tillie..... " "
Sinsabaugh, Miss C..... " "
Cunningham, H..... ... " "
Farron, Wm..... " "
Dennis, J. R..... ....21 Wall street, "
Shaw, Miss Cassie.....Relief Operator, "
Carroll, P..... " "
Ferguson, R. L..... " "
Tubbs, W. J..... " "
Dickerson, Miss M. L.....Cooper Union, "
Read, Miss Mary M..... " "
Dennis, Thos. J.....Fifth Avenue Hotel, N. Y.
Waldron, G. W.....Forty-second street, "
Hermance, J. V..... .....Metropolitan Hotel, "
Vanderhoff, H. S..... ...St. Nicholas Hotel, "
Wilson, E. T.....Stewart's, "
Hallock, W. J... ....Station H, "
Jackson, M. A.....Eighth av. and Twenty-third st.
Colgan, G. M.....Fourteenth st. & Third av., N. Y.
Kostick, F..... " " "
Gittings, Tennie.....Astor place, "
Till, John P.....St. John, N. B.
Russell, E. G..... " "
Wilder, W. J.....Shediac, "
Dickerman, E. F..... .....East Wallingford, Vt.
Voonan, S. T.....Hartland, Vt.
Collins, Mrs. M. E.....Mason Village, N. H.
Hoyt, W. E .. ..W. Canaan, "
Bumpus, Miss M. S.....Boston, Mass.
Van Deusen, W. H.....Canaan, Ct.
Maynard, Chas.....Montville, Ct.
Bailey, A. J., Jr.....New Haven, Ct.
Davis, E. P.....Readville, Ills.
Meade, P. J.....River Point, R. I.
Williams, H. M... .....Southington, Ct.
Pepper, H. M.....Springfield, Mass.
Hardy, E. M., Jr..... ...Waterbury, Ct.
Marston, R. G.. ....Yarmouthport, Mass.
Mulcahey, Roger. .....Brookfield, "
Smith, F. S.... .....Albany, N. Y.
Pindy, J. M.....Haverstraw, N. Y.
Smith, Miss M. L .....Hudson, "
Christie, Miss J. M.....Nyack, "
Horton, W. H..... . .....Millensville, "
Gardner, W. H..... ....Bedford, "
Buxton, James..... ... ...Brewsters, "
Emery, E. W .....Auburn, "
Beald, C. S.....Booneville, "
Rindge, R. E.....Norwich, "
Seeley, A..... .....Schenectady, "
Powers, E. B.....Rochester, "
Cragie, George H.....Hornellsville, "
Hagenbuck, T. H..... .....Newburgh, "
Bradnac, T.....Chicago, Ill.
Fox, E. M.... ..... " "
Foss, F. D .... " "
Bell, E..... ..... " "
Burns, E..... ... " "
Stearns, C. A..... .....Janesville, Wis.
Tefft, J. L.....Springfield, Ill.
Harter, W. F.....Lawrence, Ks.
Griggs, Miss Annie.... .....Topeka, "
Lawson, C. F..... .....St. Louis, Mo.
Keene, J. P..... " "
McKenna, J. A ..... " "
Weller, T. M..... .... " "
Fleming, J. E..... " "
Gethro, Emma..... " " (Carondolet.)
Hinneman, Jas.....St. Louis, Mo.
Lewis, J.....Divide, Col.
Wheeler, T. P.....Omaha, Neb.
Peck, M. H..... .....Salt Lake.
McConnell, J. F.....Pittsburg, Pa.
Moreland, C..... ..... " "
Carroll, J..... .....Buffalo, N. Y.
Cousin, Robt..... .....Detroit, Mich.
Dean, Jeannie.... ....Milan, O.
Young, M. J.....Sandusky, O.
Gager, R. A..... ..... " "
Chapin, Jas. W.....Indianapolis, Ind.
O'Brien, Jno..... " "
Tallman, J. C.....Cincinnati, O.
Schell, C. H..... " "
Nichols, H. W..... " "
Garley, W. C..... " "
Madison, L. W.....Columbus, O.
Vincent, O. B..... Huntington, W. Va.
Carnes, E. K..... ..Vincennes, Ind.
Crawl, H. R..... :..... " "
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Pearson, A. M..... .....Hillsboro, "
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Fuller, J. H.....Kittrello, N. C.
Borden, J. J.....Lilesville, "
McGovern, Geo.....Richmond, Va.
Sneid, H. S..... .....Warrenton, N. C.
Shumati, W. B. G..... " Jct., Va.
Overton, M. E.....Augusta, Ga.
Bell, G. W.....Charleston, S. C.
Hernandez, T. P..... ..Ellaville, Fla.
Rowland, J. J..... .....Fair Bluff, N. C.
Sellers, J. A.....Montezuma, Ga.
Graham, J. M.....Orangeburg, S. C.
Thornton, F. J.....Aberdeen, Miss.
Griswold, A. B..... .. ..Montgomery, Ala.
Cooke, P.....Montgomery, Ala.
Davis, W. G..... " "
Thompson, Jno..... .....Mobile, Ala.
Bowman, J. B.....Pelham, "
Guntharp, A. L.....Coffeeville, Miss.
Elzemf, L.....Kenner, La.
Lewis, R .....New Orleans, La.
Allen, Sam. M..... " "
McLemon, T. P... .....Tangepahoa, La.
Gwynn, F. G.....Austin, Texas.
Bond, M. M.....Calvert, "
Sinko, G. L.... .....Corsicanna, Texas.
Ritchie, D. B.....Herndon, "
Beard, T. R..... .....Harrisburg, "
Cosnahan, C. W..... .....McKinney, "
Kennedy, W. H .....McDade, "
Dunbar, Jno. K.....San Antonia, "
Ray, J. C.....Troupe, "
Weiss, C. A.....San Francisco, Cal.
Gilman, N. A.... .....Oreana, Nev.

RESIGNATIONS.

Bancker, Jno. L.....Baltimore, Md.
Pennock, Geo. B .....Bordentown, N. J.
Mehaffey, J. H.....Huntington, Pa.
Lindsay, U. C.....Mifflin, Pa.
Cooper, R. P.....Newark, N. J.
Larkins, A..... ... .Perth Amboy, N. J.
Greene, Harry W.....Philadelphia, Pa.
Tindle, T. Jr..... Pottsville, Pa.
Beidler, W. H.....Reading, "
Blackham, D..... .....145 Broadway, N. Y.
Chipman, M..... ..... " "
Null, J. H..... " "
Carpenter, C. C..... ... " "
Morris, G. W..... ... " "
Mather, Jno..... " "
Hutley, F..... " "
Brooks, R. P.....Fifth Ave. Hotel, "
Flynn, T. F.....Stewart's, "
Wallace, Miss Susie ... .117 Worth st., "
Lewis, P. A..... .....8th Ave. and 23d street, N. Y.
Robbins, Miss Mary.....Annapolis, N. S.
Calnek, T. H. S.....Kentville, "
Cleveland, F. H.....Shediac, N. B.
Nutting, A.....Augusta, Me
Welch, J. L.....Hartland,
Hall, M. E..... .....Mason Village, N. H.
Perley, J. Q..... .....W. Canaan,
Prescott, F. W.....Boston, Mass.
Watson, F.... .....Canaan, Ct.
Stanton, R. F. .....Montville, Ct.
Hill, W. H.....New Haven, Ct.
M'Inenny, Miss A.....River Pt., R, I.
Sheldon, A. C.....Southington, Ct.
Smith, Miss Izette N.....Yarmouthport, Mass.
Kennedy, M. E.....Brookfield. "
Baldwin, V. R. .....Albany, N. Y.
Hennance, J. N. W.....Haverstraw, "
Merrick, Miss E.....Hudson, "
Lyon, D. S..... ...Nyack, "
Gardner, A. D.....Millenville, "
Gay, J. W..... ....Brewsters, "
Gager, R. M..... .....Auburn, "
Doig, A. R.... ....Booneville, "
Weller, J. W..... .....Norwich, "
Smith, E. F. .....Schenectady, "
Morgan, A. B. .....Rochester, "
Everts, E..... " "
Stephens, E. .....Chicago, Ill.
Conneli, J. O. ..... " "
Geist, G. T.... ..... " "
Hall, D. McD. ..... " "
Wilkinson, G. N. ..... " "
Stone, E. D. S. ..... " "
Stevens, C. A..... " "
O'Connor, J..... .. . " "
Latley, E. W..... " "
Valentine, R.....Janesville, Wis.
Powers, E .....Lawrence, Ks.
Wilson, E. W.....St. Louis, Mo.
Davlin, P..... " "
Weiss, C. A..... ..Divide, Col.
Soule, C. S.....Omaha, Neb.
Painter, L. M. .....Salt Lake.
Griswold, A. B.....Buffalo, N. Y.
Cutler, C. S..... " "
Wilson, D. S. ..... " "
Spooneberg, C. L.....Detroit, Mich.
Perrine, W. J.... .....E. Saginaw.
Dean, M. A.....Milan, O.
Weller, T. M.....Sandusky, O.
Lawson, C. J..... .....Cincinnati, "
Cummings, Geo..... " "
Humphrey, R..... " "
Baldridge, J. R. ... .Huntington, W. Va.
McCread, S. S.....Vincennes, Ind.
Rowland, J. J.....Henderson, N. C.
Corley, J. G. .....Hillsboro', "
Jackson, J. M. .....Knoxville, Tenn.
Blackwell, W. H.....Kittrell, N. C.
Barnes, Jas. H.....Lilesville, "
Crouch, T. L.....Richmond, Va.
Spencer, H. B.....Nashville, Tenn.
Pusey, W. H.....Charleston, S. C.
Brash, C. H. ....Ellaville, Fla.
Galloway, W. C.....Fair Bluff, N. C.
Clack, J. B.....Montezuma, Ga.
Beatty, L. T. .....Marion, S. C.
Deville, G. W.....Millen, Ga.
Millen, W. H..... .....Aberdeen, Miss.
Boyd, D. J.....Pelham, Ala.
Surgi. Hy.....Kenner, La.
Fitzpatrick, T. J..... .....Tangepahoa, La.
Shefers, F. M.....Monroe "
Sandford, D. R.... .....Corsicanna, Tex.
Herndon, G. L.....Groesbeck "
Montgomery, C. W ....Hearne "
Reynolds, J. P.....McDade "
Carsan, C. F..... .....Victoria "
Burr, Platt... .....San Francisco, Cal.
Buttolph, H. L..... " "
Berry, R. K..... " "
Rowe, S. G.....Durant, Miss. Died.
Collins, F. M.....Stanisby, Tex. "

TRANSFERS.

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William Taylor	Allentown, Pa.....	Hoboken, N. J.
G. O. Gregg.....	Communipaw, N. J..	Philadelphia, Pa.
Jno. Bressler.....	Hummelstown, Pa...	Huntington "
Buckwell, M. D....	Mchts. Exchg. (Phila).	Philadelphia "
Sitzenstalter, J.....	Wilkesbarre, Pa.....	Communipaw, N. J.
Bowne, W. L.....	145 Broadway, N. Y..	Vice Presdt's Office.
Dougherty, F.....	" "	Paterson, N. J.
Lawney, Miss Georgiana.....	" "	Astor Place, N. Y.
Nash, Miss Louisa..	" "	" "
Wilson, R. J.....	" "	8th ave. & 23d st. N.Y

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Donohue, P. K.	Cooper Union	14th st. & 3d ave.	"
Belknap, Miss Kate.	"	"	"
Byrne, E.	"	"	"
Cooke, Miss Josie A.	"	Astor Place	"
Raymond, C. T.	Earle's Hotel	Relief Operator	"
North, J. W.	St. Nich. "	Earle's Hotel	"
Foster, J. J.	Halifax, N. S.	Kentville, N. S.	
Holbrook, Mrs. M. F.	Readville, Mass.	Forest Hill, Mass.	
Colson, J. B.	Springfield "	Boston	"
Lowe, Geo. H.	Waterbury Ct.	Watertown Ct.	
Cox, F. P.	Newburgh, N. Y.	145 Broadway, N. Y.	
Rawlings, Carroll C.	St. Louis, Mo.	Lincoln, Neb.	
Clark, Chas. M.	" "	Kansas City, Mo.	
Schroeder, W. E.	Cash Up City	Pet. Centre, Pa.	
Wise, R. R.	E. Foxburg, Pa.	Foxburg	"
De Long, J. C	Triumph "	Wheeling, W. Va.	
Tinale, W. C.	Wheeling, W. Va.	Toledo, O.	
Cheney, G. E.	Indianopolis, Ind.	Cincinnati "	
Grant, Jno. J.	Huntington, W. Va.	" "	
Pucci, J. C.	Warrenton, N, C.	Marion, S. C.	
Burch, G. C.	Orangeburg, S. C.	Millen, Ga.	
Pope, R. S.	Cartersville, Ga.	Kingston "	
Wright, J. O.	Kingston "	Cartersville "	
Larcombe, H. S.	Montgomery, Ala.	Nashville, Tenn.	
Hart, M. C.	Mobile "	Atlanta, Ga.	
West, J. T.	Coffeeville, Miss.	Durant, Miss.	
Lines, H. F.	New Orleans, La.	Houston, Tex.	
Vosburg, E. B.	Monroe "	Shreveport, La.	
Sanborne, T. H. H.	Calvert, Tex.	Indianola, Tex.	
Woodworth, S. T.	Indianola "	Victoria "	
Sinclair, Alex.	McKinney "	Hearne "	
More, J. C.	Troupe "	Overton "	

LIGHT.

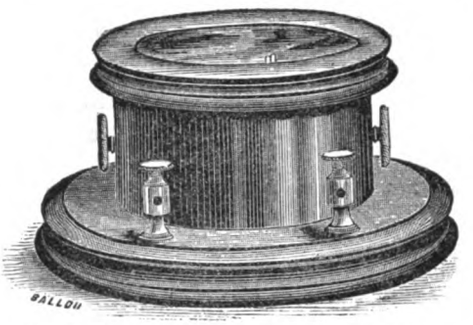
According to the theory generally received at present, the whole universe is an immeasurable sea of highly attenuated matter, imperceptible to the senses, in which the heavenly bodies move with scarcely any impediment. The fluid, which is called ether, fills the whole of space—fills the intervals between the heavenly bodies, as well as the pores or interstices between the atoms of a substance. The smallest particles of this subtle matter are in constant vibratory motion; when this motion is communicated to the retina of the eye, it produces, if the impression on the nerves be sufficiently strong, a sensation which we call light. Every substance, therefore, which sets the ether in powerful vibration, is luminous; strong vibrations are perceived as intense light, and weak vibrations as faint light; both of them proceed from the luminous object at the extraordinary speed of 186,000 miles in a second, and they necessarily diminish in strength in proportion as they spread themselves over a greater space. Light is not, therefore, a separate substance, but only the vibration of a substance, which, according to its various forms of motion, generate light, heat, or electricity.

EFFECTS OF MAGNETISM ON IRON.—During the recent session of the National Academy of Sciences, at Cambridge, Mass., Professor Mayer gave some interesting information regarding the effect of magnetism on iron. He states that he has discovered, by means of the Saxton Comparator, that rods of iron suffered a permanent elongation by magnetization of one hundred and fifty millionths of an inch. English refined iron gave a maximum of elongation, scrap iron the minimum. Whether the current was gradually increased in intensity, or whether it was sent full charge at once, it produced the same degree of elongation. With one cell the elongation took place in six-tenths of a second; with twenty-five cells it took place in two-tenths of a second. Professor Pierce thought if the elongation of iron under magnetization were true, it might make its effect on the earth in an appreciable difference in the length of the day. This could be detected by astromomy. A change in the day of seven-hundredths of a second would be perfectly easy to discover now.

M. A. BUELL,

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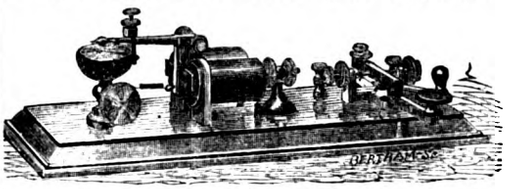
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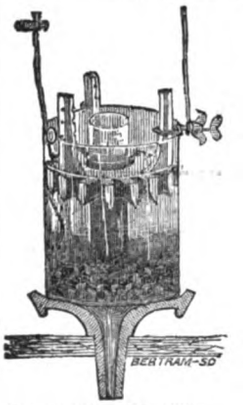
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 10. NEW YORK, APRIL 15, 1873. WHOLE NO. 131.

ELECTRICAL MACHINES.

The first electrical machine was invented by Otto Guericke, to whom science is also indebted for the invention of the air-pump. It consisted of a ball of sulphur which was turned upon its axis by one person, while another held his hands upon the ball, thus causing the friction necessary for the production of electricity. The result was that the globe was negatively electrified, and the positive electricity escaped into the earth through the hands of the operator. This machine, however, was capable of producing only very feeble efforts, and the sparks obtained from it were visible only in the dark. An English philosopher, Hawksbee, substituted a globe of glass for the globe of sulphur; the electricity thus obtained was positive, and the sparks obtained by the new machine were of considerable brightness. The machine, however, was for the time superseded by the use of glass tubes, which continued to be the favorite instruments for generating electricity until the middle of the eighteenth century, when a German philosopher, Boze, professor of physics at Wittemberg, revived and perfected Hawksbee's machine, which became universally adopted. This machine consisted of a large wheel, round which was passed an endless cord, which, passing also round a pulley, served to turn a glass globe when the wheel was set in motion. The electricity thus produced was collected on a conductor suspended from the ceiling by silk cords.

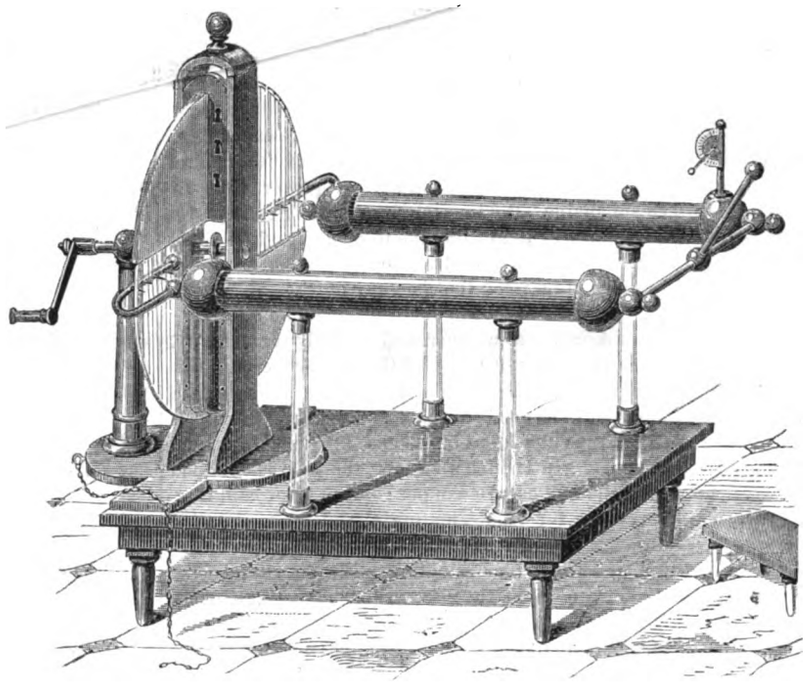


Fig. 1.

This mode of applying friction by the hand, which is evidently rude and defective, was nevertheless long used for want of a better, though many attempts were made to replace it by the use of rubbers of leather, stuffed with hair, and pressed against the globe by means of regulating screws. The shape of the globe rendered the use of these very difficult, and it was not until a cylinder was substituted for the globe that they were generally adopted.

The kind of machine most commonly employed at present is the plate-machine, invented by Ramsden about 1768, and only slightly changed and improved since.

The most usual form of this machine is shown in Fig. 1. It has a circular plate of glass, which turns on an axis supported by two wooden uprights. On each side of the plate, at the upper and lower parts of the uprights, are two cushions, which act as rubbers when the plate is turned. In front of the plate are two metallic conductors supported on glass legs, and terminating in branches, which are bent round the plate at the middle of its height, and are studded with points projecting towards it. The plate becomes charged with positive electricity by friction against the cushions, and gives off its electricity through the points to the two conductors, or, what amounts to the same thing, the conductors give off negative electricity through the points to the positively-electrified plate. In order to avoid loss of electricity from that portion of the plate which is passing from the cushions to the points, sectoral pieces of oiled skin are placed so as to cover it on both sides. The cushions become negatively electrified by the friction; and the machine will not continue working unless this negative electricity is allowed to escape. The cushions are accordingly connected with the earth by means of metal plates let into their supports.

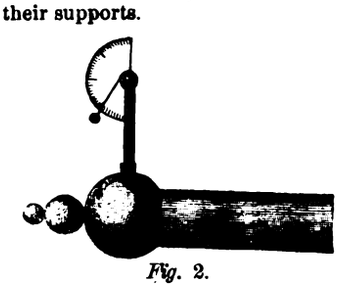


Fig. 2.

As the conductors become more highly charged, they lose electricity to the air more rapidly, and a time soon arrives when they lose electricity as fast as they receive it from the plate. After this, if the machine continues to be working uniformly, their charge remains nearly constant. This limiting amount of charge depends very much upon the condition of the air; and in damp weather the machine often refuses to work unless special means are employed to keep it dry.

The rubbers are covered with a metallic preparation, of which several different kinds are employed. Sometimes it is the compound called *aurum musivum* (bisulphide of tin), but more frequently an amalgam. Kienmeier's amalgam consists of one part of zinc, one of tin, and two of mercury. The amalgam is mixed with grease to make it adhere to the leather or silk which forms the face of the cushion.

Before using the machine, the glass legs which support the conductors should be wiped with a warm dry cloth. The plate must also be cleaned from any dust or portions of amalgam which may adhere to it, and, lastly, dried with a hot cloth or paper. When these precautions are taken, the machine, if standing near a fire, will always work; but the charging of Leyden jars, and especially of batteries, may be rendered impossible by bad weather.

The variations of charge are indicated by the *quadrant electroscope* (fig. 2), which is attached to one of the conductors. It consists of an upright conducting stem supporting a quadrant, or more commonly a semicircle of ivory, at whose centre a light needle of ivory is jointed, carrying a pith-ball at its end. When there is no charge in the conductor, this pendulum hangs vertically; and as the charge increases it is repelled further and further from the stem. In damp weather it will be observed to return to the vertical position almost immediately on ceasing to turn the machine, while in very favorable circumstances it gives a sensible indication of charge after two or three minutes.

Ramsden's machine furnishes only positive electricity. In order to obtain negative electricity, it is necessary to insulate the cushions from the ground, and to place them in communication with an insulated conductor. An arrangement of this kind is adopted in Nairne's machine.

In this machine a large cylinder of glass revolves between two separately insulated conductors. One of these has a row of points projecting towards the glass, and collects positive electricity. The other is connected with the rubber, and collects negative. If one kind of electricity only is required, the conductor which furnishes the other must be connected with the ground.

Winter, of Vienna, has introduced some modifications in Ramsden's machine.

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Instead of four cushions, there are only two, which are in communication with a spherical conductor supported on a glass pillar. This may be used to collect negative electricity in the same way as the negative conductor in Nairne's machine. The chief or positive conductor consists of an insulated sphere, on the top of which is often another sphere of smaller size. The positive electricity is collected from the plate by means of two rings opposite to each other, one on each side of the plate. On the side next the plate they have a groove, which is lined with metal and studded with points. They are supported by an arm which is inserted in the positive conductor. The size of the positive conductor is often increased by the addition of a very large ring three or four feet in diameter, which is supported on the top of the large sphere. The ring consists of very stout brass wire inclosed in well-polished mahogany.

Winter's machine appears to give longer sparks than the ordinary machine under the same circumstances. This circumstance is owing, partly at least, to the considerable distance between the rubber and the positive conductor, which prevents the occurrence of discharges between them.

CAN ELECTRICITY BE UTILIZED AS A MOTIVE POWER.

Ever since the invention of the electro-magnet, by Sturgeon, this question has occupied the attention of inventors. Those who have seen a huge mass of iron made capable of attracting an iron bar with a force of several thousand pounds, and this through the agency of a few pieces of zinc and platinum of comparatively small size, cannot easily be divested of the idea that this arrangement is capable of giving rise to a powerful motor. In addition to this, however, it is a fact that electro-motors of considerable power have been constructed. The late Professor Page, under Government patronage, made an electro-motor of several horse-power; and Froment, of Paris, has for a long time carried on the manufacture of small electro-motors, intended to turn lathes, sewing-machines, etc. So that now the question is not, Can machinery be run by means of electricity? but can electricity be *profitably* employed for this purpose?

So far as the present state of the science enables us to decide, it is universally conceded that whatever the amount of power required exceeds that of one or two horses, electricity is a far more expensive agent than steam. The only persons who refuse to concede this point, are those who greatly over-estimate the amount of work done by a small motor; and those who, like Paine, of Newark, make—well, we may perhaps be allowed to say—"claims which they cannot easily substantiate." But while we freely concede that electricity is a most expensive means of obtaining power, we are inclined to believe, that, in some cases, where but a fraction of a horse-power is needed, this agent may be employed with economy and convenience. At the same time, however, we ought to bear in mind that the construction of an electro-motor that shall be capable of giving even a tolerable approximation to the result that ought to be obtained from the consumption of a given amount of zinc, demands a degree of knowledge and skill greater than is possessed by the manufacturers of most machines of this kind now in market. As this subject is at present attracting a good deal of attention, it may not be inopportune to consider a few of the conditions upon which success in this direction must depend.

Machines have already been devised and constructed which, when driven by electricity, give results that are far more economical for the power used, than is the ordinary steam-engine, with its connection. Even Rankine concedes this in his work on "Prime Movers," and considers that the efficiency of electro-magnetic engines, is "four times that of the best engines yet known." And if the electro-magnetic engines which he describes, are those from which this ratio of efficiency has been determined, we may safely double or treble it; the best engine described in his work being an old form devised by Prof. Page, and found in most American collections of apparatus, although Rankine attributes its invention to Froment. In the work referred to, the Daniell battery is regarded as the most efficient, giving 1,095,468 foot-pounds per pound of zinc; while Smee's battery gives but 694,800 foot-pounds for the same quantity of metal. In the case of Daniell's battery, a horse-power would require the consumption of about 1.8 pounds of zinc per hour, which is about one-tenth the theoretical efficiency of carbon. And setting aside the costs of acids, and allowing the electro-magnetic engine to be four times as efficient as the heat engine, it is evident that until ten pounds of zinc sell for the price of four pounds of carbon, the electro-magnetic engine cannot compete with the heat engine. When coal sells for one-quarter of a cent per pound, and a pound of zinc sells for 13 cents, the power obtained by the electro-magnetic engine will cost one hundred and thirty times the amount required for an equal amount of power from the steam-engine. But in most electro-motors, the power costs not less than from five to eight hundred times what steam power costs. To reduce this great disproportion between the economy of the two agents, every effort must be made to produce the electricity in an economical manner, and to apply it efficiently. To this end, we must see that the battery we employ is so constructed that the materials which are consumed are used in as crude a shape as possible. In all batteries, the chief items of expense are acids, zinc, and mercury. In Daniell's battery, the acid is obtained from the sulphate of copper; but the zinc and mercury used for amalgamating the zinc are supplied directly. Now, it is well known, that in the ordinary system of amalgamating zinc, the mercury is never recovered; the zinc, instead of being entirely consumed, becomes useless, even while a considerable portion remains. The remainder, which always contains the greater part of the mercury, is usually sent to the foundry to be recast, during which process a large portion of the zinc itself is wasted, and the whole of the mercury is driven off in vapor. This source of loss must be avoided; and it is easily done if the battery be so constructed that the zinc-pole may be formed of any old fragments of zinc, and not necessarily of a mass cast specially for the purpose. Moreover, by using zinc in this shape, we can employ the waste chippings of the shops, by which means the cost of the zinc is reduced fully two-thirds, and the mercury is entirely saved.

Having so arranged matters that the materials consumed will cost the least possible amount, our next object should be to obtain the greatest possible returns in the products generated in the battery. We are aware that this has always been a very attractive object with most inventors of new batteries. We have always been told that the chemicals produced in these batteries might be sold for more than the cost of the original materials; but our own experience has been that it is impossible to realize the cost of collecting them, much less the cost of preparing them. The fact is, that while such compounds as the sulphate of zinc, sulphate of iron, etc., are valuable and marketable in large quantities, they cannot be sold in small lots. Ten pounds of sulphate of zinc cannot be sold for enough to pay for the trouble of finding a market for it. The only exceptions to this are the metals. Five pounds of copper can be readily and profitably sold, and there is a market for it at every brass-foundry. We must, therefore, so arrange it that the copper-pole of the battery can be sold without making any sacrifice. If we use expensive poles, carefully fitted up, we cannot afford to dispose of them when they become heavy. Now for a Daniel's battery: a piece of stout copper wire, rolled up spirally so as to form a sort of lining to the outer vessel, is all the pole that is needed. When copper has been deposited upon it to such an extent that it is too heavy and cumbersome, it may be sent to the foundry and sold for old copper.

The last point that presents itself, is the internal resistance of the battery, and its relation to the resistance offered by the coils of the magnet. The law is that the resistance outside the battery should be exactly equal to the resistance inside; but this rule we have frequently seen most grossly violated. On one occasion, we have seen an electro-magnetic engine driven by a series of sixteen Bunsen cells, every one of which was capable of sending its full current through the coils of the magnet! But this point has been so fully discussed, that it is now pretty generally understood. Sufficient attention, however, is not given to the reduction of the resistance in the battery. Thin cells, preferably of good brown paper, a close approximation of the copper and zinc, and the use of poor conducting liquids, are the means for securing this object.

But even, after all our care, the electro-magnet engine remains an expensive mode of procuring power. Still, from the fact that it does not produce smoke, ashes, or fumes, is not dangerous, and can be used at a moment's warning, it may very possibly come into very extensive use, as soon as some intelligent manufacturer produces an article of moderate excellence. —*Industrial Monthly.*

ELECTRICAL RESISTANCE OF METALS.

THE results of some of the recent researches on the electrical resistance of various metals have been published by M. Benoit, who gives the following table of the specific resistances, at Zero Centigrade, of 1 metre in length by 1 square millemetre in section, measured by two different systems; namely, in *Ohms* and in *Siemen's Units*—and the conductivities reduced to a ratio in reference to that of silver as a standard:

	Ohms.	Siemen's units.	Silver unity.
Silver–pure, annealed	0·0154	0·0161	100·00
Copper–annealed	0·0171	0·0179	90·00
Silver–($\frac{1}{1000}$) annealed	0·0193	0·0201	80·00
Gold–pure, annealed	0·0217	0·0227	71·00
Aluminium–annealed	0·0309	0·0324	49·70
Magnesium–hammered	0·0423	0·0443	36·40
Zinc–pure, annealed at 350° C	0·0565	0·0591	27·50
Zinc–pure, hammered	0·0594	0 0621	25·90
Cadmium–pure, hammered	0·0685	0·0716	22·50
Brass–annealed	0·0691	0·0723	22·30
Steel–annealed	0·1099	0·1149	14·00
Tin–pure	0·1161	0·1214	13·30
Aluminium Bronze–annealed	0·1189	0·1243	13·00
Iron–annealed	0·1216	0·1272	12·70
Palladium–annealed	0·1384	0·1447	11·10
Platinum–annealed	0·1575	0·1647	9·77
Thallium	0·1831	0·1914	8·41
Lead–pure	0·1985	0·2075	7·76
Maillechort–annealed	0·2654	0·2775	5·80
Mercury–pure	0·9564	1·0000	1·61

These results were found to vary according to temperature.

M. SORTAIS, in France, has invented an electrical device which is placed in the holds of vessels. In case of a leak or the entrance of too much water into the bilge, a current is established and a communicator is set in operation, signifying the fact to the commander and the officer of the deck.

ASPECTS OF INTERNATIONAL TELEGRAPHY DURING WAR TIME.

Though peace and war are obliged, for the sake of appearances, to sustain a sort of formal opposition to each other, they are, nevertheless, such excellent friends in reality that it is difficult to know how one could ever survive the other. War has afforded practice for doctors, has procured news for editors, has led to discoveries in nosology, has opened vast regions for commerce, and has furnished with facts and statistics airy speculators of all sorts. Peace, on the other hand, is always willing to see her inventions and discoveries adapted for purposes of destruction to human life. Her improved knowledge of ship building, of mechanics generally, of chemistry, of optics, are all at the service of war. But is her old friend as welcome to the last adaptation of one of her most vital discoveries—the electric telegraph? Peace will have to draw the line somewhere, and it looks as if it might be here. For while the construction of systems of telegraphy would be of the greatest use for warlike purposes, their destruction would be equally an object in the same cause; and such a policy as that would be so diametrically opposed to the interests of peace, as to make it imperative to consider the aspects of international telegraphy in time of war.

The telegraph, by land or sea, is *prima facie* one of the first considerations of either belligerent. To know the enemy's position, to ascertain its numerical force, to order arms and ammunition from remote emporiums, are all processes open to electric help. But then these wires measure tracts of territory—these cables stretch some thousand leagues; hence a hostile army on march or a cruising man-of-war can render the stations thus connected useless, just by severing the wires or cables at single points. Again, what havoc might ensue if one of the belligerents captured a telegraphic station belonging to the other side, and succeeded in keeping that fact to himself! The insight that might be obtained into the working of the opposite side, the misleading advice and false communications that could be sent, might turn the fortune of a war. This possibility would in itself be a source of danger, which, coupled with the necessary liability to destruction, goes far towards limiting the warlike advantages to be derived from the systems of telegraphy with which the world is enriched. Of course the extent to which the new apparatus might be employed by belligerents to further their conflict would be strictly confined to those wires and cables either under their complete control or possessed in common; but it is also evident that those systems shared by either belligerent with a neutral power would be in danger of destruction.

Consideration for the safety of such valuable property, and of such an indispensable accessory to our modern civilization, would induce neutral nations to be on the alert to save the telegraph, which is as remarkable for its precarious situation as for its invaluable use; and neutrals will have a clear right to insist on the preservation of their own cables or wires; but they can only demand that respect for property by observing certain conditions, which belligerents have an equal right to impose. The case when a neutral and a belligerent share cables or land telegraphs would be in itself a weighty subject for international legislation; for the facilities with which the position of the neutral might be turned to account are so obvious as only to increase the jealousy on all sides. By a pre-arranged understanding, cunningly adjusted trade communications, with a sober, business-like sound in their wording, might easily be made to convey important tidings or suggestions of tactics. The possibility of some such manœuvre would, of course, be felt by each belligerent, and would produce perpetual anxiety about the wires which cross its enemy's frontiers from a neutral state beyond, or about the cables which connect its shores with foreign coasts abroad; and that anxiety would create constant suspicion, and in many cases might induce actual attack. The "tone" of an impartial press, the attitude of a neutral Government, would be jealously watched by the belligerent who might not happen to share any overland wires or submarine cable with the non-belligerent State. Indeed, the tendency of the present day is to develop this jealousy of neutrals felt by belligerents, as witness the decision of the tribunal at Geneva. The opposite feeling existed in former days, when the increased demand for arms and ammunition caused by the declaration of war was looked upon by merchants of neutral States as a legitimate spur to certain branches of commerce. The increase in the difficulties inevitably following a declaration of war has doubtless contributed to bring about this reaction. For the same reason belligerents are more jealous of neutrals than they used to be. Again, owing to the development of telegraphy, all the nations are more in mutual contact. Each sees more of the game than used to be practicable; each is, in fact, more of a bystander, who could help either belligerent if so disposed. We have to take these things into account. Since nations now have this concrete tie of telegraphic machinery—representing in itself so much expenditure and profit, and forming a bond of union for which bygone days offer no precedent whatever—it behooves all the States concerned to devise some means for preserving the property, which no one Power can alone protect. Already we have the opinion of Sir James Anderson that no land telegraphs or cables need be destroyed during war time, all nations being sufficiently enlightened to "arrange conditions to control or suspend" them, as it may seem advisable, "without resorting to the barbarism of destroying them."

On the other hand, so long as neutrals observed the conditions imposed by the state of war, they would obviously retain the right not only to continue the ordinary traffic by cable or wire, but also to ally together for mutual protection of property in telegraphy by land or sea, and to send any trade messages, perhaps even into a belligerent country. Again, if a belligerent, in order to cripple her adversary, were to sever the wires or cable of a neutral, that neutral would in its turn have a distinct claim to regard the offending belligerent as having made war upon her, and to act accordingly. Peace must be considered before war, especially in such a case as the present. International telegraphy is a *sine qua non* of international commerce, and is a necessary means of social intercourse. But there is yet another cause it serves—it is the staunch friend of science. To cite a prominent instance, meteorology—a science long kept back for want of copious data obtained simultaneously from distant places—has recently taken a gigantic stride through the sole agency of telegraphy. In fact, we sum up the innumerable boons conferred upon us by the telegraph, when we say that it is the last and most effective addition to the machinery of progress; so much so, that if we might trust the sanguine, we might almost believe the epoch of war to have passed its meridian!

That happy time, however, has not yet been attained; and meanwhile we have other things to attend to which are at least as practical and more immediately urgent. A new kind of international property has sprung into existence, and it demands protection against its own special risks. It is therefore desirable that we should have rules and regulations for the protection of international telegraphy. The case is just one of those for the consideration of the Periodical Congress which the Emperor Napoleon suggested as a means of international legislation. But, in the meantime, governments and directors of private telegraphic companies should consider their position while they have yet time; for it would indeed be a matter for grave reproach were they to find themselves unprepared when they realize the emergencies which can be foreseen.—*Telegraphic Journal.*

FOUL AIR SIGNAL.

We abound in inventions to warn us of fire and to alarm the household at the approach of a burglar—but there is an insidious foe who enters everywhere, in every apartment of private houses, and riots unmolested in all public places, of whose presence we are not warned in time to make good our escape. We refer to bad air. It is perfectly notorious that no public or private buildings are adequately supplied with ventilation, and the consequences are more injurious than we are apt to believe. In default of suitable ventilation it would be well to have some kind of a signal to warn us of the danger, or a contrivance to automatically open the door or window. The presence of fire damp in the mines is made known by the explosion of the small volume of air in the Davy safety lamp. When this explosion takes place in the narrow compass of the wire gauze the miner knows that it is better to retreat until this dangerous gas can be blown out. Unfortunately the gases of close rooms are not of this explosive character; if they were, we should not suffer so much from bad ventilation as we now do, as no one would run the risk of being blown up for the pleasure of being suffocated. The gas which leaks through stoves and furnaces, and arises from imperfect combustion, known as carbonic oxide, can be absorbed in a way to betray its presence by the following ingenious invention: The apparatus consists of a small galvanic battery with a bell attached, and an open test tube containing liquid chloride of palladium. The chloride of palladium is extremely sensitive to the presence of carbonic acid gas; it absorbs the gas and precipitates metallic palladium; the deposition of the metal in the bottom of the tube makes the connection of the galvanic current, and at once rings the bell, which will not stop until the current is broken. The invention is found to work admirably for carbonic oxide gas, and the next thing is to devise a plan for disclosing the presence of carbonic acid gas. It is possible that this could be done by putting in a carefully counterpoised balance some caustic baryta of lime, which, by the absorption of the carbonic acid of the air, would sink and cause the current to be closed in the battery and the bell be rung. The same contrivance could be made to open and close a shutter, just as the draft of a stove is regulated by the rise of mercury in a thermometer connected with a battery. It would be a novel experience on any public occasion to have the proceedings interrupted by the ringing of bells until equilibrium was restored by proper ventilation. We should all take kindly to the interruption, and be thankful for a whiff of pure air. Let us by all means have a Palladium Ventilating Company organized, for the benefit of gasping humanity.—*Scientific American.*

He that has no resources of mind is more to be pitied than he who is in want of necessaries for the body.

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CORRESPONDENCE.

To the Editor of the Journal of the Telegraph:

In regard to the adoption of the European alphabet, I think the majority, if not all, the operators, are opposed to it. Hoping that what I may say may help its destruction, I venture for the first time to trespass on your valuable space, for on so an important a matter as this I must do all I can for the right. The employés of this office are decidedly opposed to its adoption. We can't agree with you that the greater portion of errors are attributable to the spaced letters of the Morse alphabet, and contend that if those letters are properly made by the sender there's no excuse for the receiver making an error. The Morse alphabet cannot be improved upon. Compared with the European, it is shorter, less complicated, easier of transmission, and can be made in considerably less time. Some of the European letters are positively painful to make, while the numerals are even frightful to look at; a special wire will have to be provided to send the cyphers. You say that its adoption will be for the welfare of both the Company and its employees. I beg to differ with you; I think it would create the utmost confusion, and, pecuniarily, the Company would be very sorry for it. For the first six months of its use there would be no end of errors. Of course the most expert operators would readily acquire it, but that class are largely in the minority. When the Company take into consideration the amount of crude talent in the rural districts, they will realize the magnitude of the task before them. Why, the people of the United States might as well be told that, if after six months they were not prepared to speak "Greek," they should be prohibited from earning a living. The length of the letters will reduce the speed, thereby taking up more time, while the questions and amount of conversation in regard to it, over the wires, will, before it is thoroughly understood, cause confusion and delay; the responsibility and care of the operator will be increased. If the officers of the Company are in favor of it I am very sorry to hear it, and hope they will give the matter due consideration, inviting opinions from their employees before deciding on so important a matter; one which would result so disastrously to them, their employés and the public. The trouble is not with the Morse alphabet, but in the way it is mutilated by the senders, good senders being about as scarce as some receivers are when a lot of press, or a pile of messages are awaiting them. Every error that occurs (provided the receiver does not guess at, put in, or leave out a word, and there being no trouble on the wire), is the fault of the sender, the receiver to be competent, of course. The amount of it is this, that between competent operators there are no errors. Here are a few of the most common abuses of the Morse system: TH is transformed into an 8, MI into a 7, ME into G, AN into 1, six dots are made for a P, IN into Q, LS into B, and several others. Some of the above are under the writer's own observation, and occur daily. Another abuse is the way senders run their words together. One result of this is to get the letter S of the signature on to the last word of the message. For instance, if the last word is "Case," it is made "Cases." The dashed letters come in for space also; they are made sometimes as if the maker was afraid of them. There are cases which occur every day under our own observation where one operator writes the word "to" E. O., and another sends us messages from "Pimsburg." The word "am" and the name "Ham" is sent "all" and "hall," and *vice versa*. Some cyphers are a succession of T's. We think the sender should be equally if not more responsible for errors than the receiver.

A final word as to the styles of sending, and I will trespass on your valuable space no further. Some try to write so stylish (either with a clip or a drag) that it is imperfect. Others (and this is very common) try to write too fast, without regard to the result. I have seen operators (because a receiver happened to break a few times) deliberately write as bad as possible for the latter's benefit; others to gratify personal spite will try to drive a receiver off the wire by rushing him. Now this is all wrong; a man to thus "trifle" with the Company's business, and increase the liability to error on the part of the receiver, does not deserve a situation. It is also a question whether some operators don't send with their feet. Give me a man who always has a regular, steady, medium, plain style of sending, who, while endeavoring to send as plain as possible, also respects the rights and feelings of the receiver, and who takes every precaution to insure correctness and to guard against error. There is no occasion for breaking such a one, or asking what such and such a word is. Finally, I think the adoption of this European alphabet will create the utmost confusion, and I hope to hear from my fellow-sufferers on the subject.

REFORM.

GLEN COVE, March 28th, 1873.

To the Editor of the Journal of the Telegraph:

I noticed in your last issue an article in regard to the change of Alphabet, from our present one to the European, which may be well; my experience in telegraphing is too limited to give an opinion on the subject, but, as far as it has been looked into, it seems to me that the change would be desirable; but what I wish to give my humble opinion on, in the event of the adoption of the said (European) alphabet, is the manner in which the change should be made effective, and at the same time prevent difficulties that might arise by suddenly throwing upon operators the use of an alphabet, nearly one half of which is different—by transposition and otherwise.

The article I referred to is not before me, but if my memory serves me correctly, the writer, "H.," suggests that all operators ("Western Union") be directed to learn the new alphabet by the first day of January, 1874, and that it shall go into effect on that date, and all who may not have learned to use it shall be subject to 10 per cent. deduction of wages, each month thereafter, until they shall have accomplished it.

As to the per cent. deduction I have nothing to say; but I think the matter of securing the knowledge of the new alphabet to each operator could be accomplished, and with less liability to errors, &c., in this manner: for instance—say the European involves a change of twelve letters—let a month's notice be given to each operator, that on and after the first day of June, for instance, that the letters "C" and "J," according to the European alphabet, would be substituted for the same letters of the Morse alphabet now in use, and that on the first day of July the letters "F" and "Q" should be substituted, and so on until the whole number of letters and figures shall have been changed. My idea, though rudely expressed, I hope may be understood.

It seems to me that if the whole change is thrown at once on the army of operators, that it will not meet with the prompt success that would be effected by the gradual manner shown.

The art of operating is learned gradually. So should the learning of these new arrangements of sound be taught.

I admit that many operators might learn them all, in a few weeks; but, to take in view the many minds and again the difference of opportunity and application, it becomes another matter.

But where is the operator who could not get command of two letters per month, so that when the next month rolled around the two letters learned the past month would be so familiar to the ear as to leave the mind entirely free to grasp the next in order. Much more might be said, but I have already occupied too much of your valuable time.

W B. ROBINSON.

To the Editor of the Journal of the Telegraph:

Everything done which tends to simplify practice, to lesson error, to reduce exceptions, seems to me to be leading in the right direction.

To put the European alphabet into practice requires how much time?

Twenty-four hours is enough for any operator who can read readily by paper or by sound, and this includes all of us. In other words, there is not an operator in the employ of the W. U., or any railway company, who cannot make a success of the change in that time. The more expert the operator, the more messages he handles as a rule, and for him the change will be least perplexing. Those who handle but few messages will find plenty of time to correct, here and there, an error, by comparing with the European chart of characters. I say these things because I know them to be true.

In the early history of the JOURNAL, a number of operators at Cleveland, Ohio, learned, in a few minutes, an alphabet something like the European, and put it into practice with operators at Toledo and Detroit. After manipulating a few messages the old alphabet was not more thoroughly imbedded in the mind.

Were every operator furnished with a card alphabet on the first of June, with a notice that on the second of June, at a certain hour, the new characters would go into practice, they would be better prepared than if they were given one month, six weeks, or a year. This is reasonable. Such is human nature. And I will add, that if the cards be distributed on a certain day, with the notice as above, more time to learn the new will be taken, than if a month or more were first to elapse. We all know that any boy or girl of fourteen can learn the Morse characters in a day or a few days. In changing from the present to the new, we operators learn nothing. We only think a little, for we know what a dash is and what a dot is, and if we hear *ajjount* we know it is *account*, and if *Wizziam* it is *William*. I learned, practiced and transacted paid "biz" with the new alphabet, in half an hour after I got sight of it. Let's start in on the European to-morrow, or to-day.

To the Editor of the Journal of the Telegraph:

Evidently, the spaced letters, with *l* ——, are the only ones that need to be changed. I suggest that the characters now representing the first seven digits be used, in their order, in place of the objectionable letters. These characters being already learned, and coming in order in the alphabet, would become familiar to the ear sooner than new characters, while the figures, being used less often, could be represented by new characters to better advantage than the letters, which are used much more frequently.

The simplicity of our alphabet is its advantage. It would be impossible to make another so good. *C*, the first objectionable letter, being represented by 1; *l*, the second, by 2; *o*, the third, by 3, &c., would be very easily understood and put in practice, while an entirely new alphabet would be learned with more difficulty than we think, perhaps. N. W. O.

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To the Editor of the Journal of the Telegraph:

Since my first communication relative to changing the alphabet, I have conversed with several experts, who object to the wholesale change. They say the object—getting rid of the spaced letters, and of *l* and the cypher—can be easily accomplished by changing those characters alone, and that there is really no advantage in having our alphabet like that of Europe. It is also suggested that one letter be changed at a time, to make transition easy. These opinions seem to be very general, and, as we can thus accomplish the main object sought, I acquiesce.

The strongest objection urged to the European alphabet is that many of their letters are ours, changed in name. Thus our J is made C; our Q, F; our X, L, &c., &c.

Adopting, then, the suggestions made, of changing the objectionable letters only, I submit the following:

Substitute two dashes for the space in C, thus: - - — — - and make R its reverse, - — — - -; make O, - — - - — -; Y, - - — - — - -; L, — — - —; Z, - - - — - -; &, - - — - - -; and Cypher, - — - - — -.

In changing these, I have made the C and R the reverse of each other, and the Z and character &, that the former relation of these letters to each other might be preserved.

How does this change meet the views of your readers? Let all speak. H.

Massachusetts, March 24th, 1873.

To the Editor of the Journal of the Telegraph:

If you will allow me space, I will say a word or two in defence of our old Morse alphabet, which some ambitious but possibly misguided operators seem to be anxious to exchange for the "European" or some other improved form.

I am one of the majority of American operators who think that Hamlet's remark,

> "Better bear the ills we have
> Than fly to others that we know not of,"

will apply to this case.

We can readily understand why it was more convenient, in using the European bell and needle telegraph, to adopt an alphabet which should be free from spaced letters. But with our "Morse" sounder in the hands of a competent operator, our short, spaced letters are much less objectionable than the longer combinations of the European alphabet.

In a communication of the last Journal it is assumed as a "well-known fact" that most of the errors in transmission in this country are the result of the use of spaced letters.

I cannot agree with this conclusion. I think the "well-known fact" is that at least three-quarters of the errors are chargeable to carelessness and poorly-written *originals*, or to the same defect in the copies taken at repeating offices. It is hardly fair to blame our alphabet for such errors.

Again: the vaunted "European" alphabet will not prove a great gain in reliability, if we may judge by "cable" business. I have had some experience on cable circuits, and all who have will admit that errors between New York and Plaister Cove, and New York and Duxbury, are almost unknown, while on the European lines and the cables they are quite frequent. Most of these are trivial errors, but errors nevertheless.

With regard to speed, I have been assured by well informed operators that the New York and Duxbury Circuit is able, in a pressure of business, to do enough in one hour of fast work to keep the St. Pierre cable busy three hours or more, even in good weather, when the short St. Pierre cable can be worked nearly as fast as a land line.

But the great and insurmountable obstacle to this sweeping change is the fact that it will prove impossible. Probably half the offices in this country are run in connection with some other business—railroad, express, post-office, or commercial business; and this class of operators have neither time nor inclination to learn and practice the new alphabet.

The proposed change could only be carried out on the strictly "commercial" and press circuits between the principal cities. The result of its adoption would be to make "plugs" of all our best operators for at least a year to come; to cause serious confusion and delay in the business, and consequently loss to those companies which might attempt to force the measure; and if the question of its adoption were submitted to vote, it would be rejected by nine-tenths of the operators of America.

The American alphabet has stood the test of thirty years' use, and has proved itself the most rapid and accurate system yet devised for practical use upon all kinds of work. As it seems to be distinctively an American institution, why change it merely to be in "European" style. If there must be a change, let us substitute new combinations for the spaced letters only, retaining the other letters as given us by our own Morse. I prefer the original.

Yankee Alphabet.

Washington, D. C., April 5, 1873.

To the Editor of the Journal of the Telegraph:

The question of a proposed change of alphabet having assumed so wide a range, and being seriously agitated in the Journal, I presume a few lines in opposition thereto will not be out of place. After carefully examining the so-called International Morse Alphabet, I am at a loss to see where any benefit can be derived therefrom by substituting it for the Morse. It seems to me a change would be disrespectful to the Father of the Telegraph, if this alphabet was substituted for the one of which he was the founder. Really I cannot see where it is even as good as the Morse. Having worked at the key steady for the past fifteen years, I have never experienced any difficulty in receiving Morse, except perhaps when I would occasionally get hold of a plug; and I claim to have done my share of telegraphing, it being no uncommon thing to sit from 8 A. M. till 5 P. M. without an opportunity to leave my instrument for a moment, in order to keep hooks clear. It also seems plain that any telegraph company in the United States that would adopt a new alphabet would be the losers thereby, because their good operators now would become inferior ones then, for a considerable time at least. The Morse system can certainly be manipulated faster than the International; and if we have "plugs" now, we will have them then. I quite agree with the writer of the Cleveland article, signed C. F. S., that the European alphabet has nothing to do with the one used in America. I think we Americans can paddle our own canoe. In conclusion, I trust this agitation of a change will cease, and that every operator in America who has a decent respect for the inventor of the electric telegraph, will cling to the American (Morse) system as the mariner clings to the ship when the night and the tempest close around him.

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S. L. Fetterman.—The Morse and Hughes instruments are used almost exclusively in Switzerland. We believe that no sounders are used. The alphabet is that combination of Morse signals, known as the International. The batteries are some form of the Voltaic pile.

Night Opr.—Anonymous communications are not inserted in the Journal.

Messenger.—The duties of a messenger in a country office, where only a small business is done, can hardly be defined specifically. If he is paid by the week or month, it would be within the line of his duty to sweep and dust out the office, light the fire in cold weather, and, perhaps, under supervision of the manager, keep the local batteries in order. In short he should make himself generally useful. A messenger is not responsible for the charges upon a message, if the party refuses to pay.

Miss S.—When a person sending a message desires the operator to insure an answer, the proper reply to be made would be that it is impossible, but that reasonable effort will be made to obtain one. The information contained in Rule 13 should also be imparted to the customer. In the event of no answer being returned, he would then, at trifling expense, receive all the satisfaction possible to be obtained.

Reader of the Journal.—The greatest number of words sent with a Morse instrument in one hour, of which we find record, is 2,631. This was done by Mr. E. M. Shape in February, 1868, sending from Milwaukee to St. Paul, a distance of 450 miles. In the same month Mr. R. J. Hutchinson sent from New York to Philadelphia 1,352 words in thirty minutes. Many operators have attained a higher speed than 2,500 words per hour. The highest rate per minute was probably achieved in these tests. The skill and ability displayed by the operators who received and copied the words sent at this unparalleled rate of speed is much more wonderful than that it was possible to transmit them.

Jersey.—The best way to clear a local zinc is to wash and brush it thoroughly in water. In offices where no messenger is employed, operators are expected to make diligent efforts to deliver messages; should it be impossible to deliver a message, the office at which the message originated should be immediately notified, giving the reason. Read Rule 58.

W.—In forwarding a message which had been received collect at your office, to another point by mail, without being directed to do so by proper authority, you imposed a grave responsibility upon the company, and rendered yourself personally liable for the charges upon the message. The proper course would have been to have notified the office where the message originated, and awaited instructions.

C. B. S.—Half-rate business cannot be received for any station not upon the Western Union lines, except such office is a half-rate office. The full tariff should be collected for this company as well as for the other.

Council Bluff's Office.—See reply to C. B. S.

Manager.—Every word contained in a message, except date, address, and signature (one), must be charged for. The words "Answer before four o'clock." "Answer, Globe Hotel," and everything of a similar nature should form part of the body of a message. When a message is signed, for instance, John Jones, for Singer Sewing Machine, the four words following the actual signature should be counted and charged for. Likewise, John Smith, per James Brown, three words. The decisions and instructions given in the Journal are by authority, and are to be observed as the law until countermanded.

C. P. McAllister.—There are thirteen words in: "I desire to meet you at the St. James, at nine thirty to-night." Rule 9 says: "Names of persons and places, where given to *things*, must be counted according to the number of distinct words in each."

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
April 15, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Hereafter the tariff for other lines from Columbus, Ga., to Union Springs, Ala., will be 65 and 4.
Marianna, Ark., closed.
Amity, Ind., closed.
Red River, Ind. Terr., changed to Colbert.
Tip Top, Iowa, changed to Arcadia.
De Soto, Kansas, re-opened.
Quitman, Miss., re-opened.
Griffin Crossing, Mo., changed to Griffin.
Neshanic, N. J., re-opened.
Alder Creek, N. Y., is now an other line office; tariff for other lines, 25 and 2 from Utica, N. Y.
The office at Pleasant Valley, Luzerne Co., Pa., will hereafter be checked direct.
Stewart's Station, Tenn., re-opened.

Business which has heretofore been sent via Marshall, Texas, to the following other line offices, may also be sent and checked to Sherman, Texas, at rates here given;

Bonham, Texas	35	2	510	Sherman, Texas.
Clarksville, Red River Co., Tex.	75	5	510	" "
DeKalb, Texas,	75	5	510	" "
Paris, "	50	3	510	" "

La Crosse, Wis., will hereafter be checked as an other line office; tariff 55 and 4 for other lines from Chicago for "offices having special sheet A," and as per tariff book for all others. The order in last JOURNAL making La Crosse a "check direct" office will therefore be disregarded.

NEW OFFICES.

294 Brock's Gap, Ala.
286 Deatsville, Ala.
294 Jemison, Ala.
25 Moosup, Conn.
327 Cruger, Ill.
327 Lawndale, Ill.

* Murphysboro, Ill.	35	3	329	Carbondale, Ill.
* Sand Ridge, Ill.	50	5	329	" "

509 Colbert, Ind. Terr.
454 Arcadia, Iowa.
301 Crofton, Ky.
310 Earlington, Ky.
310 Hanson, "
301 Petersburg, Ky.
310 Sebree City, Ky.
310 Slaughtersville, Ky.
301 Trenton, "
67 Henderson, Md.
21 Waverly, Mass.
389 Bigbee, Mo.
418 Keytesville, Mo.
389 New Bloomfield, Mo.

* Castor Land, N. Y.	35	2	57	Utica, N. Y.
* Glensdale, "	35	2	57	" "
* Great Bend, "	35	2	57	" "
* Remsen, "	25	2	57	" "
* Trenton, "	25	2	57	" "

150 Leon, O.
159 Clifton, Pa.
59 Hayville, Pa., check Kellysville, Pa.
66 Orwigsburg, Pa.
140 Turkey City, Pa.

* Covington, Pa.	35	2	88	Corning, N. Y.

175 Langley, S. C.
292 Bakers, Tenn.
283 Cedar Hill, Tenn.
509 Red River City, Texas.

* Edinburg, Va.	60	4	77	Alexandria, Va.
* Front Royal, Va.	45	3	77	"
* Harrisonburg, Va	60	4	77	"
* Leesburg, "	35	2	77	"
* Mt. Jackson. "	60	4	77	"
* New Market, "	60	4	77	"
* Piedmont, Fauquier Co., Va.	40	3	77	"
* Plains, Va.	40	3	77	"
* Woodstock, Va.	55	4	77	"

Arabela, Mo., new office opened in last JOURNAL, should read Arbela, Mo., and Bealey's Sta., Mass., should read Braley's Sta.

ATLANTIC CABLE BUSINESS.

We are notified that messages intended to go to China and Japan by the Great Northern route, should in future be addressed *via Siberia*, instead of via Russia, as heretofore. The tariff remains unchanged.

CUBA CABLE BUSINESS.

We are notified that communication between Dominica and Martinique is restored. The tariff to Martinique, St. Lucia, St. Vincent, Grenada, Barbadoes, Trinidad, Demerara and Berbice, will be 50 cents less than that given in JOURNAL of February 15, 1873. The additional word rate will remain unchanged.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, April 15th, 1873.

On and after May 1st, money order offices will be established at the following-named points in D. H. Bates' district:

Bedford, Pa.	Lebanon, Pa.
Belvidere, N. J.	Lewes, Del.
Berwick, Pa.	Lewistown, Pa.
Bloomsburg, Pa.	Millville, N. J.
Burlington, N. J.	Minersville, Pa.
Bridgeton, N. J.	Morristown, Pa.
Cambridge, Md.	Newcastle, Del.
Camden, N. J.	Orange, N. J.
Clearfield, Pa.	Perth Amboy, N. J.
Communipaw S. yds., N. J.	Phillipsburg, Pa.
Centralia, Pa.	Pottstown, Pa.
Crisfield, Md.	Princeton, N. J.
Dover, Del.	Salem, N. J.
Easton, Md.	Seaford, Del.
Freehold, N. J.	Shenandoah, Pa.
Gettysburg, Pa.	South Amboy, N. J.
Girardville, Pa.	Tyrone, Pa.
Huntingdon, Pa.	Vineland, N. J.

G. H. MUMFORD, *Vice-Pres't.*

THE INTERNATIONAL OCEAN TELEGRAPH COMPANY.—ELECTION OF OFFICERS.—A special meeting of the International Ocean Telegraph Company was held at the office of the Company, No. 88 Liberty street, on Tuesday, April 1st. The Board of Directors was reconstructed, and the management of the Company transferred to the Western Union Company, which now holds the controling interest in the Company.

The following officers were elected in place of the former officials, who resigned in accordance with the arrangement made when the stock was sold to the Western Union Company:

William Orton, President; Norvin Green, Vice-President; George H. Mumford, Secretary.

Directors—Messrs. Wm. Orton, Norvin Green, Cambridge Livingston, Augustus Schell, George H. Mumford, Wm. F. Smith, Horace F. Clark, Alonzo B. Cornell and E. S. Sandford.

THE BROKEN ATLANTIC CABLE.—The test made by Mr. Willoughby Smith, the electrician of the Anglo-American Telegraph Company, at Valentia, locates the fault at 568 miles from Valentia. The Admiralty chart shows a depth of 1,875 fathoms of water at this point. Arrangements will be made to pick up and repair the cable during the present season.

THE operators employed on the line of the Consolidated European and North American Railway are arranging to meet at a dinner, to be given by themselves, at Vanceboro, Me., the object being to bring all the operators on the line together, so that they may become personally acquainted. A Committee of Management has been appointed, which has received the sanction of the Superintendent to proceed with the affair. No doubt it will result satisfactorily.

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKNOWLEDGMENT OF RECEIPTS FOR ASSESSMENTS 39, 40 AND 41, UP TO APRIL 10TH.

The acknowledgment of receipt of any assessment is to be understood as an acknowledgment for all previous assessments.

6	25	28	37	41	42	46	52	54	56	59
61	64	65	67	72	74	77	78	86	91	99
113	121	122	166	169	175	183	188	213	215	220
228	231	235	244	245	254	257	269	274	276	291
312	319	333	342	352	361	367	380	383	391	394
402	405	406	413	414	416	426	430	431	433	434
438	459	463	464	478	509	510	516	526	532	536
542	547	548	549	552	554	562	564	570	576	577
586	587	622	623	629	642	655	660	661	662	663
664	665	669	671	685	698	704	708	731	740	750
751	756	758	764	769	789	791	797	803	821	830
831	832	842	858	873	874	875	876	886	912	917
920	922	923	938	952	976	978	995	1005	1009	1013
1023	1024	1046	1054	1055	1056	1061	1069	1073	1074	1075
1076	1081	1084	1087	1088	1090	1093	1111	1126	1137	1143
1148	1151	1155	1156	1157	1159	1160	1162	1173	1174	1183
1185	1195	1200	1204	1225	1232	1233	1245	1248	1254	1258
1259	1260	1271	1273	1276	1277	1282	1295	1298	1303	1304
1329	1343	1345	1356	1359	1363	1364	1365	1368	1371	1383
1402	1403	1404	1409	1410	1440	1444	1445	1448	1487	1488
1492	1508	1511	1517	1518	1520	1522	1524	1527	1531	1535
1537	1549	1550	1552	1558	1560	1561	1565	1566	1568	1571
1579	1582	1588	1590	1591	1593	1594	1615	1622	1626	1629
1631	1632	1635	1644	1648	1650	1658	1678	1684	1685	1686
1687	1688	1695	1697	1698	1708	1709	1710	1711	1713	1719
1720	1721	1723	1724	1728	1730	1735	1737	1781	1791	1798
1799	1800	1803	1809	1811	1812	1815	1817	1839	1840	1841
1847	1848	1849	1851	1852	1869	1870	1881	1894	1900	1901
1902	1903									

ASSESSMENTS 37 & 38.

43	90	178	597	652	1029	1170	1209	1270	1367	1462
1461	1509	1584								

ASSESSMENT 40.

941.

Notwithstanding the frequency of deaths during the past few months, making a corresponding number of assessments necessary, our Association continues to increase in membership and efficiency.

On the second of the current month there were (including those who have recently joined) 1,278 members in good standing; and although at every assessment a greater or less number drop out by reason of failure to respond, our progress has been steadily onward, and the payments we have been able to make have been greater each successive time.

The following is a statement of the returns to the double assessment of February 1st, 1873:

Paid in to the credit of	Assessment No. 37	$1,117 00
do.	do. 38	1,128 00

A small manual, giving a short history of the Association, general rules of the Executive Committee governing its operation, articles of association, mortuary list, etc., has just been issued and can be had on application to the Secretary. A supply will shortly be sent to the agents, from whom copies may also be obtained.

NEW YORK, April 7, 1873.

To the Editor of the Journal of the Telegraph:

I notice in your answer to Operator K, in your issue of April 1, you state, "There is always a consumption of material going on in a battery." I beg leave to state that this is not the case in the Leclanche Battery, as there is no waste at all when the battery is not in use. As this battery is being introduced extensively in this country, it is but fair to have the above fact known.

HILBORNE L. ROOSEVELT.

NEW ADVERTISEMENTS.

Partrick Bunnell & Co., Giant Sounder.

George H. Bliss & Co., The Amateur's Telegraph Apparatus.

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FOREIGN TELEGRAPHIC ITEMS

THE NEW CABLE OF THE FRENCH ATLANTIC CABLE COMPANY.

The *Great Eastern*, lying in the Medway, has received on board the whole of the deep-sea section of the new Atlantic cable. Already there have been four cables laid, three of them being in successful operation at this moment. The first, laid and broken in 1865, picked up and completed in 1866; and the second, laid in 1866, from Valentia, in Kerry, to Newfoundland, belong to the Atlantic Telegraph Company and to the Anglo-American Telegraph Company. The third, laid in 1868, from Brest to New York, belongs to the Société du Cable Transatlantique Français. The new cable is the property of the same company, and it is intended to lay it in May and June, the ship being appointed to leave her moorings on the 10th of May. It is remarkable that the wires of this new cable, which is nominally the property of a French company, will both leave and enter British soil. If the Telegraph Construction and Maintenance Company will only keep to themselves the course of the ship during the laying, and the bearings of the cable, this new cable will give us, in case of war, a direct communication with Canada, independent of the land lines of Newfoundland, which, in Winter, are more or less liable to interruption, and of the wires crossing the wildest part of the west of Ireland, where at such a time the disaffected might take a fancy to injure them. The point of departure is a place called Germoe, on the north side of Mount's Bay, Cornwall, and the cable will be landed at Freshwater Cove, in Halifax harbor, on a piece of land in the occupation of the War Office, by which leave to use the cove has been granted. There will then be laid a branch cable from Freshwater Cove to Hog Island, near the end of Long Island, and only fifteen miles from Sandy Hook, nor much more from Brooklyn. The new cable differs somewhat from any of those hitherto laid, either to America or elsewhere. There are seven No. 18-gauge copper wires, twisted in a spiral, weighing 300 lb. per nautical mile, and these are covered with four coats of gutta percha, with thin layers of Chatterton's compound, this amounting to 400 lb. per knot. The diameter of each wire is ·0048 inch; of the strand, ·0146 inch; and of the wire and gutta percha and compound, ·0464 inch. This core is served with hemp, and the hemp is again protected by ten wires drawn from homogeneous iron, each wire being swathed in five yarns of Manilla hemp laid on spirally, with a tarry compound to preserve it. The cable weighs nearly two cwt. per knot more than the previous cables; but it is even stronger in proportion, and is calculated to last at least twice as long under the same conditions.

THE ATLANTIC SUBMARINE CABLE MONOPOLY AND COMPETITION.—The existing Atlantic Telegraph Companies will shortly have four lines between Europe and America, gaining about £688,000 of gross receipts at a cost of 10 per cent. for working, and enabling them to divide £340,000 among their shareholders, after making large additions to their reserves. This success has, doubtless, led to the formation of a new company, whose prospectus is just issued, although four lines are more than enough to do the work. When the fifth line is laid the least of the mischiefs which will result will be that the £340,000 of net earnings will have to be divided between about five millions instead of four millions of capital, reducing the dividends of the old lines by one-fifth. This will be the effect on the shareholding interest if the new company succeeds. And the effect of its success on the public will be that the lost one-fifth of the dividend will require to be made up, for both the old and the new capital, before the aggregate companies will be in the position that the existing companies are in at present for conceding a reduction of tariffs.

OFFICIAL ESTIMATE OF THE BRITISH POSTAL TELEGRAPH FOR 1873–74.

The official estimate for the telegraph service in the financial year 1873–74 puts the probable revenue at £1,220,000, and the working expenses and maintenance at £815,000, leaving a surplus of £405,000. The wires used for public messages alone, exclusive of those which belong to the railway companies, and are used principally for railway, and secondarily for public purposes, form a system of 100,098 miles. and the wires leased by the department to private firms or individuals for the transmission of messages on their own business between offices and factories. make a system of 5,187 miles. The total is 105,285 miles, and this mileage of wire serves 3,640 postal telegraph offices, and 1,097 renters of private wires. There are 435 of these renters in the metropolitan division—202 in the north-western, 183 in the northern, 46 in the north-eastern, 33 in the southern, 6 in the eastern; 154 in Scotland, 38 in Ireland. The pneumatic tubes worked in London extend through a length of 12,800 yards; in provincial towns, 8,069 yards—namely, 2,700 in Dublin, 2,403 in Liverpool, 2,026 in Manchester, 698 in Birmingham, 242 in Glasgow. The estimate provides for upwards of 6,000 telegraph messengers.

THE recent depression in Newfoundland Telegraph shares appears to have arisen from the fact that the Newfoundland Government has reserved the right to purchase the lines at a valuation in the year 1874. But as the company is earning about fifteen per cent. per annum, twenty years' purchase would give a handsome return to the present shareholders, apart from their land rights, estimated to be worth £4 per share.

THE Board of the Anglo-American Telegraph Company have resolved to pay the usual interim dividend of two per cent. on the 1st of May next for the quarter ending the 31st of March.

THE German Chancellor demands 4,000,000 thalers of the French indemnity for strategical and administrative telegraphs.

Committees of the Anglo-American Telegraph Company, the Société du Cable Transatlantique and the New York, Newfoundland and London Telegraph Companies have agreed upon an immediate amalgamation of those lines, subject to ratification by the Boards of Directors of each Company.

RESOLUTIONS have been passed by the Boards of the British Indian Extension, China Submarine, and the British Australian Telegraph Companies, agreeing, subject to the assent of the shareholders, to amalgamate their several undertakings on the basis of an allotment of shares in the amalgamated company as follows:—British Indian Extension, £15 per share; China Submarine, £11 per share; British Australian, £11 per share.

IN PERU, Henry Meiggs, the Railway King, is substituting telegraph instruments of American style in place of English, which, heretofore, have been exclusively used.

IT IS reported that the directors of the Panama and South Pacific Telegraph Company are of opinion that the present contract ought to be canceled, the deposit of 40,000*l.* returned, and other matters in dispute arranged, and (if necessary) a new contract entered into either with the present contractors or some other construction company.

INDO-EUROPEAN TELEGRAPH.

The report states that the receipts for the year 1872, amounted to £37,079, as compared with £48,949 in 1871—showing a falling off of £11,870. The £37,079 included £12,000 claimed by the Post-office, and disputed by the company. The expenditure on commercial account, amounted in twelve months, to £13,789, as against £14,601 for the year 1871—showing a reduction of £812. The balance on revenue account, after charging the £12,000 for the disputed item, amounted to £11,315. Of this sum £2,676 had to be set aside to the liquidation of the Persian debt account. The contractor's account for maintenance, for the year ending September 30 last, amounted to £22,972, and therefore, under the arrangement made in July, 1870, the balance of £8,528, together with the amount credited this year to the liquidation of the Persian debt, and any portion of the £12,000 which might be recovered from the Post office, would be accepted by them in full settlement of their claim. The diminution in the receipts of the company, was to be ascribed to the interruptions sustained over the entire line, between London and Kurrachee during 1872, and to the reduction of tariffs, which came into operation last July. The interruptions on the company's section of the through line showed an improvement of 45 per cent. upon those sustained during the year 1871. Unfortunately however, the interruptions on the section of the line between Teheran and Kurrachee, more than neutralized the improvement on the company's section. The long duration of those latter, was in great part owing to the disturbed state of Persia, consequent upon the fearful famine and distress in 1872. The country was now, happily, nearly restored to its former condition, and was rapidly improving. For the current year, up to the date of this report, the receipts exhibited an increase of 50 per cent., and for February, of upwards of 60 per cent. on those of 1872. In order to neutralize the effect of packing, and to afford additional facilities to the public, the directors had formally proposed to the Indian Government, that a word tariff, beginning with ten words, at half the present rate for twenty words, should be introduced as speedily as possible—any number of words above ten to be charged at 4s. per word, being in the same proportion. It was proposed to extend the same measure to Batavia, Australia, China, and the Straits Settlements. The balance sheet showed that £420,713 had been expended on the construction of the line.

THE River Plate Telegraph Company's cable between Montevideo and Buenos Ayres has been successfully laid.

SENOR ENRIQUEZ LEFEVRE of Panama is in Mexico to complete a contract for telegraph lines between Tehuantepec and Oaxaca, a distance of 85 leagues.

THE total number of messages forwarded from postal telegraph stations in the United Kingdom for the week ended March 15th was 312,147—an increase on the corresponding week of last year of 59,715.

THE total number of messages forwarded from postal telegraph stations in the United Kingdom, for the week ended March 22, 1873, was 305,508—an increase on the corresponding week of last year of 31,865.

NEW CABLE BETWEEN JAMAICA AND COLON.—The West India and Panama Telegraph Company has contracted with the Telegraph Maintenance Company to lay a new cable between Jamaica and Colon, and to repair the others. Sir Charles Bright and the India Rubber Company have notified that this independent movement in no way relieves the original contractors, or prejudices the claims of the Company for compensation for their many breaches of contract.—*Panama Star and Herald.*

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, APRIL 15, 1873.

COURTEOUS RECEPTION IN ENGLAND OF THE WESTERN UNION COMMISSION.

In letters received from Messrs. Prescott and Eckert, now in Europe, mention is made of the kindness and courtesy with which they have been received by all classes of the telegraphers in England. Every facility has been afforded them to examine into the working of the British system, and in this way a great mass of information has been acquired, which will be made available to our own service upon their return. Mr. Scudamore, the Director of Postal Telegraphs in Great Britain, detailed Mr. Culley, Engineer-in-Chief, to accompany Messrs. Prescott and Eckert in their tour of inspection, and, conducted by that gentleman, they visited most of the principal telegraphic points in England and Scotland.

At the present writing the Commissioners are visiting the telegraphic centres on the Continent.

General Eckert is expected home about the 1st of May, while Mr. Prescott will remain to attend the Vienna Exposition.

A WORD TO OUR CORRESPONDENTS.

We surrender in this, as in former issues of the JOURNAL, considerable space to correspondents, who desire to express their views on the proposed change of alphabet, by the substitution of other characters for the spaced letters. A large number of communications which have been received upon this subject, throw but little light upon the matter, but exhibit a considerable amount of prejudice. It should be remembered that a change in the alphabet will take place only for good and sufficient cause. Make your comunications short and to the point. Bear in mind that space in a newspaper is valuable, and that life is short.

OWING to typographical and other errors, the notice to managers regarding business done under "Red" Franks, which appeared in the last JOURNAL, was incorrect. The following is the correct version of the order:

Managers of offices in returning, with their Monthly (No. 4) report, the business done under "Red" Franks, should enter such on a separate blank from other half-rate messages, or press, and indorse the statements "Refunded under Executive Order No. 143." All such messages should bear upon their face the amount of tolls at full rates, and the number of Frank on account of which one-half of the (full) tolls is refunded.

HOW THE BRITISH POSTAL TELEGRAPH SERVICE IS MADE TO SHOW A PROFIT.

The outlook of the British Postal Telegraph does not brighten. In fact their wonderful success, pecuniarily, *vide* Scudamore, Creswell, Sauer, Lines, Hubbard, &c., is only apparent in the able manner in which the public has been deceived, and public money expended. Since the government has controlled the lines, nearly sixteen million dollars have been added to the capital account, and the end is not yet. Expenditures in excess of receipts has been going on at the rate of over three millions per year, the deficiency being placed to account of capital. To avoid unpleasant and embarrassing enquiries, during the past two years trust funds in the hands of the government have been diverted ("misappropriated" is the term used) to cover expenses for extensions and improvement of the lines, in the probable view that such appropriation would, when brought to light, be legalized, that the step having been taken, the government could not recede. The true state of affairs has been recently exposed by a committee of the House of Commons, and a further investigation, which has been recommended, will doubtless be made.

Perhaps Mr. Creswell will incorporate these facts into his next annual report, in support of his scheme, while Messrs. Hubbard and Ramsey will use them to intensify their patriotic appeals for the privilege of putting public money into private pockets. The figures of this small expenditure for extensions and improvements may also be useful to the "estimate man."

MANY of our readers will probably recollect the amusing case of an individual who joined the Telegraph Life Association in the early part of its history, and who, after paying two or three assessments, sent in his withdrawal on the ground that he "did not receive any benefit from the Association, and saw no reason why he should pay out his money for it." His case is somewhat eclipsed by a philanthropic gentleman in Iowa, concerning whom an agent writes: He paid his dollar and a half for a certificate of membership in the Association, because the "small-pox was epidemic in his place." His great soul was in fear. His life was jeopardized. In time a member died, a dollar was called for, our friend failed to respond. The agent wrote, reminding him of his duty. The response came that "the epidemic had subsided," and he declined to pay.

ADVANTAGE is to be taken of the gathering of men of science of all nations during the International Exhibition at Vienna to convene a congress on the question of patent rights. It will meet on the 4th of August, and will be composed of manufacturers, scientific men, political economists, and skilled workmen.

PROGRESS OF THE ELECTRIC TELEGRAPH IN AMERICA SINCE 1866.

The year 1866 marks an epoch in the history of the telegraph in America, hardly second to that of the introduction of this means of communication. The advance in electric science, more particularly in its bearings upon the art of telegraphy, is a subject of wonder and admiration. The assertion is safe, that more real progress has been made within the past seven years than in the whole twenty-five years preceding. The laws which govern the electric current, if current it may be called, have become familiar as household words in our ears. New projects in telegraphy are of almost daily announcement. Theories, many of them possessing novelty, and some few, merit, are continually being advanced. Electricity, in all its branches, has become the foremost science of the day.

In recording the progress of the telegraph in America, in these latter days, we shall speak more particularly of the Western Union system, under which comprehensive summary is embraced the lines of the Western Union Telegraph Company, and those of the companies with whom they connect. That this is the proper course for us to pursue will be evident from the fact that this system comprises at least nine-tenths of all the lines upon the North American Continent, and as, from the want probably of ability rather than from a lack of enterprise, the lines operated outside of this system are unable to do other than to follow in the course of the Western Union Company, the assumption that the progress of this Company represents the entire history of the progress of the telegraph, will not, probably, be brought into question.

In the United States, at, and shortly after, the time of the consolidation of the three great companies, referred to in our last article, there existed, outside of those consolidating the following lines:

Banker's and Broker's Telegraph Company, lines extending from New York to Washington; Pacific and Atlantic Telegraph Company, lines completed from Philadelphia to Pittsburg and Cincinnati, and extending; Franklin Telegraph Company, lines extending from Boston to Washington; International Telegraph Company, lines completed from Boston to Bangor, Me.; Keystone Telegraph Company, lines extending from Philadelphia to Harrisburg and Pittsburg; International Ocean Telegraph Company, lines extending from Lake City to Key West and Havana; Northern Telegraph Company, lines completed from Boston to Bristol, N. H., and extending; Atlantic and Pacific Telegraph Company, lines completed from New York to Chicago, and extending; Great Western Telegraph Company, line completed between Chicago and Milwaukee; Northwestern Telegraph Company, lines extending from Milwaukee through Wisconsin, Michigan, Iowa, and Minnesota; Mississippi Valley Telegraph Company, lines extending between St. Paul, Minn., and St. Louis, and from Dubuque to Chicago; California State Telegraph Company; Illinois and Mississippi Telegraph Company, and the Chicago and Mississippi Telegraph Company.

There were, in addition to this list, quite a large number of Companies, covering more or less territory, which, with all of the above mentioned, were independent organizations, and nearly all of them engaged in competition with each other.

In the British Provinces, there were the Montreal Telegraph Company, lines covering Upper and Lower Canada, and the New York, Newfoundland and London Telegraph Company, lines extending from Plaister Cove, Cape Breton and Heart's Content.

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In 1868, the Dominion Company, with lines extending over a portion of the Dominion of Canada, was organized, and in 1872, the Southern and Atlantic Telegraph Company, with lines from Washington, D. C., to Montgomery, Ala., commenced to operate.

Of these, the Bankers' and Brokers', Northern, International, California State, Illinois and Mississippi, and Chicago and Mississippi Companies have been absorbed by the Western Union Company, and a controlling interest in the management of a portion of the remainder has been acquired. During all of this time, the wires of this Company, in addition to the acquisitions above mentioned, have been carried by various new routes many thousands of miles, while nearly every mile of their old systems has undergone reconstruction.

Among the more important lines which were thus rebuilt, is that extending from Omaha to San Francisco. This line was originally constructed in 1862, along the emigrant route *via* Forts Kearney and Laramie, crossing the Rocky Mountains at the South Pass, and thence, *via* Salt Lake City, Forts Crittenden and Churchill, across the Sierra Nevada Mountains to Placerville, Sacramento, and San Francisco.

When this line was first operated, very little annoyance was experienced from the Indians, but subsequently, when they ascertained that it communicated, by some mysterious agency, with the soldiers, they took every opportunity to destroy it. This unfortunate change in their disposition rendered the situation of the operators—stationed in many cases miles from human habitation—extremely hazardous, and some of the stations were necessarily abandoned.

The opening of the Pacific railroads fortunately remedied these grave difficulties, and the lines were at once transferred from the old route to the railroads. New lines have since been completed over the entire length of the Pacific roads, from Omaha, Nebraska, to San Francisco, California.

The territory now occupied by the lines of this company embraces almost the entire civilized portion of the continent of North America. On the eastern coast their lines extend from Plaister Cove, on the Gulf of the St. Lawrence, to Brownsville on the Rio Grande, and on the western coast from San Diego, California, to the fisheries on the Kishyox river, eight hundred miles north of New Westminster, British Columbia. They reach across the continent, from the Atlantic to the Pacific Ocean, and embrace every State and Territory in the Union but Minnesota, New Mexico and Arizona, and include the British Provinces of Nova Scotia and New Brunswick.

On the 1st day of July, 1872, the Western Union Company controlled and operated 62,032 miles of line, 137,190 miles of wire, and 5,237 offices or stations. Of this aggregate, 1,212 miles of line and 2,742 miles of wire were in New Brunswick and Nova Scotia, and 512 miles of line, bearing one wire, in British Columbia; leaving 60,308 miles of line, and 133,936 miles of wire in the United States. Since then nearly 20,000 additional miles of wire has been strung and about 300 new offices opened.

The telegraphic facilities of the United States have been increased within less than six years past by the construction of thirty thousand miles of line and seventy thousand miles of wire, and the opening of more than three thousand new stations. Of this development the Western Union Company has provided more than half, and has expended therefor about five million dollars, in addition to the contributions of Railway Companies included in its system, which amount to two and a half million dollars more. Probably, the gross expenditure for new telegraphic property by all the companies in the country, including railways, has amounted to nearly or quite twelve millions of dollars within these six years. During this period the average charge for messages has been reduced one half, and work has been in progress for some time by the Western Union Company preparatory to further reductions, which will be made at an early day.

The nominal capital of the Western Union is $41,000,000, and its gross receipts for the year ending June 30, 1872, were $8,457,095.77.

Of the companies competing with the Western Union the following are the most important:

First. The Pacific and Atlantic, with 5,000 miles of line, and 10,000 miles of wire, extending from New York to St. Paul and St. Louis by Chicago, and to New Orleans by Cincinnati and Memphis.

Second. The Atlantic and Pacific, in connection with the telegraph of the Union Pacific Railroad, 4,500 miles of line, and 9,000 miles of wire.

Third. The Southern and Atlantic, extending from Washington, along the line of the coast, to Charleston, S. C., thence to Montgomery, Alabama.

Fourth. The Franklin, extending from Washington to Boston, 800 miles of line; 2,780 miles of wire.

Fifth. The Great Western, with headquarters at Chicago.

Sixth. The Philadelphia, Reading and Pottsville, owned and operated by the Philadelphia and Reading Railroad.

These companies have about 800 stations, and operate an aggregate mileage of 13,000 miles of wire, with 27,000 miles of wire. Their nominal capital is estimated at $16,000,000.

For the 1st of January, 1873, the telegraphic system of the United States may be thus approximately estimated:

Aggregate nominal capital, $60,000,000; length of lines, 80,000 miles; length of wire, 180,000 miles; number of stations, 6,300.

There are several important offshoots, which are not enumerated in the above summary, as, although to all intent and purpose they are lines of telegraph, yet in their aims and results they are so far removed from what is ordinarily understood to be the business of the telegraph, that they properly constitute and occupy an independent position. The most prominent among these are the Gold and Stock Telegraph Company, and the American District Telegraph Company. The first named company embraces in its operations many of the most important cities in the country, connection being had, each with the others, t rough the commercial lines of the Western Union Company. In New York City upwards of 1000 separate offices are operated, which receive uninterrupted messages during business hours relative to prices and sales, the telegraph company furnishing the operators and the instruments, and the officers of the "Stock Exhange" the information.

The latter confine their operations to furnishing messengers for service, calling policemen, and extinguishing fires for their patrons. They place instruments in any office or private house, and connect them with some one of their stations, charging a certain sum per week for the use thereof, and an extra sum in proportion to the service rendered upon a call. The machinery used by these companies is adapted to their peculiar requirements.

Any review of the experience of the telegraph in the United States would be imperfect, which omitted to call attention to the circumstance that it stands before the people of the United States as the product of private enterprise, and is not the debtor of the Government for a single dollar. Congress has given hundreds of millions for other enterprises—hundreds of millions in bonds and lands to railways, and so far as we know, not a single Telegraph Company in the United States is to-day the recipient, direcly or indirectly, of one single dollar of benefit conferred by the Federal Government.

Its development has fairly kept pace with the growth of the country, without having cost the Government a dollar, while in Europe, under Government control, the annual deficit, provided by taxation, has been several millions.

Private enterprise has already established the telegraph throughout every State in the Union, and in all the Territories but one (Arizona). The value of the services it has rendered, without charge, in the interest of science, and to sufferers by fire, and flood, and pestilence, is far beyond that of all the pecuniary contributions it has received. Millions of acres of the public domain have been granted to railway corporations, while the telegraph has received no grants of land except whereon to plant its poles.

A LESSON IN GOVERNMENT TELEGRAPHY.

The advocates of the postal telegraph system make it one of their standing arguments that the British telegraphs are yielding a handsome profit to the Post-office Department, after paying the interest on the capital invested. We have never been able to get any positive evidence in support of this assertion; on the contrary, we have had good reason to disbelieve it; and now here comes a "financial scandal," disturbing the House of Commons, and scattering all the calculations of profit to the winds. It has been discovered that the telegraph authorities have been in the habit of appropriating for the expenses of the service, not only a large surplus belonging to the post-office, but a considerable amount of savings bank deposits, a proceeding which a Parliamentary Committee, charged with an investigation of the matter, mildly characterizes as "misappropriation of a peculiarly serious character. "Last year a deceptive return of the financial transactions of the telegraph service was made, by transferring to the capital account £645,000, properly chargeable to current expenses. Parliament, nevertheless, granted an additional £1,000,000 of capital, and it appears that Mr. Scudamore, after spending all this as well as all the gross receipts of the traffic, has already drawn upon outside sources for a deficiency of £656,000, which will be increased to £800,000 by the end of the financial year.

This unwarrantable use of trust funds has caused considerable excitement in England; but the case interests us in the United States chiefly because it shows the fallacy of the idea that the Government can manage the lines with profit to itself or to the people. We were told that a postal telegraph would give cheap rates and efficient service, without cost to the tax-payers. The system has been four years in operation—long enough certainly to give it a fair trial—and this is the result.—*N. Y. Tribune.*

Telegraphica is the title of a spicy sheet edited and published by Mr. Walter P. Phillips, an erratic genius, with an overwhelming propensity for fun, which is constantly breaking out in new spots. "Laugh and grow fat" is an old saying, and, if true, five cents invested in *Telegraphica* will go further in developing adiposity than double that sum in roast beef.

Mr. Phillips is a well and favorably known telegrapher, and is now engaged in the General Office of the Western Union Company, No. 145 Broadway.

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REPORT OF THE COMMITTEE OF THE HOUSE OF COMMONS UPON THE POSTAL TELEGRAPH SERVICE.

The Commons Committee of Public Accounts, nominated on the 7th of February, 1873, and which consists of Messrs. Baxter, Sclater-Booth, Seely, Liddell, Algernon Egerton, Goldney, Candlish, Crawford, Rylands, Lord Eustace Cecil, and Mr. O'Reilly, have presented their first Report. The following are their remarks on "Vote 5—Telegraph Service:"

"Your Committee reported last year that the accounts under this head had been much disturbed by their incomplete condition as to separation of capital from current expenditure, and they were then informed that a statement of capital expenditure was in course of preparation, and would be laid before Parliament during the Session of 1872.

"To the accounts now before them the same observations apply, and the Committee are again informed by Mr. Scudamore that the statement is still incomplete, that he hopes shortly to be able to show all that has been done down to the close of February, and that it may be possible to close the capital account on the 31st of March next, except with reference to certain payments to railway companies.

"With regard to the working expenses of the year, it has been impossible to examine and report upon them in a proper manner. The vote was taken in one sum, and no details were given; while the scale of salaries and allowances, when approved by the Treasury, was not furnished to the Audit Office in time to enable the payments charged in the present account to be compared with it.

"With reference to the important point raised in the fourth paragraph of the Controller and Auditor-General's report as to the 'audit of authority,' Mr. Scudamore admits that regulations must be laid down defining what portion of the expenditure, both in kind and in amount, may be undertaken by the Postmaster-General on his own responsibility, and what will require the sanction of the Treasury.

"The Committee trust that immediate steps will be taken to frame and issue these regulations, apart from which, and from the scale of salaries above mentioned, the operations of the Controller and Auditor-General have hitherto been rendered to a great degree futile, if not illusory.

"The Controller and Auditor-General observes, in his fifth paragraph:

"'That transfers of 644,936*l.* have been made from the Telegraph Vote to capital account; that by this means the department has escaped the necessity of submitting estimates for extensions and improvements, and the control of Parliament has been avoided, though an *ex post facto* authority may be said to have been given by the Act subsequently passed granting an additional million on capital account (Telegraph Act, 1871), and that this proceeding has only been effected by applying Post Office revenue to services which should have been otherwise provided for.'

"The Committee having made inquiry of Mr. Scudamore on this point, it appears from his replies that the proceeding thus commented upon with respect to previous transactions has been repeated during the last 12 months, and that the whole of the additional million of capital granted in 1871, having been spent, the department, instead of applying to Parliament for a further grant, has continued its payments for extensions, &c., defraying the cost out of the balances in the hands of the Postmaster-General; that 656,000*l.* had been thus spent up to the end of November, 1872, and that a sum not far short of 800,000*l.* will have been so expended before the end of the current financial year, and that a large proportion of this has been derived from savings-bank deposits.

"Your Committee do not hesitate to express the opinion that this wholesale expenditure out of the balances, in anticipation of the vote, is in the highest degree irregular and objectionable, and appears to be in conflict with the provisions of the Telegraph and Savings-Bank Acts; nor can they admit the plea of urgency, seeing that four years have now elapsed since the telegraph service was taken over by the Government; but further and still more important considerations arise, to which, though less directly within their functions, they desire to call the attention of the House of Commons:

"1. Under the present system the Post Office would appear to have the uncontrolled power of dealing with balances to the extent, probably of a million in excess of its legitimate requirements.

"So far as those balances consist of savings bank deposits, such dealings must be held to amount to misappropriation of a peculiarly serious character.

"3. If, as is understood, the National Debt Commissioners are constantly kept informed of the sums due to them, some strange defect of power or activity would seem to have interfered with their obvious duty of calling for the balances with a view to investment.

"4. The check of the Audit Office, which is also supplied with monthly statements of receipt by the Postmaster-General, must be imperfect, if not altogether nugatory.

"5. The position of the Postmaster-General is compromised if the secretary in his office can carry on such enormus operations by means of moneys for which he, as chief, is liable to account to the public.

"6. Finally, what becomes of the control of the Treasury over a Revenue Department, for the due and regular conduct of which it is in the highest degree responsible if such things can happen, not once, but repeatedly, and if the abstraction of such enormous sums from their legitimate destination can continue to be unnoticed throughout the whole of a financial year, even up to the time when the statement of the year's income is formally submitted to the public? The Treasury state that they had no knowledge that the authorized capital had been exceeded, but it must be observed that the evidence taken by your Committee last year brought out the fact that such would inevitably be the case, while it was known to them that similar, though less extensive transactions were covered by the grant of the additional million in 1871. (See letter of Mr. Scudamore to the Chancellor of the Exchequer, Parliamentary Paper, No. 378—1871, page 4.)

"Your Committee have not thought it incumbent on them to pursue these investigations at present. Considering the relations in which the Post Office stands to the Treasury, it is, they think, the duty of the latter department forthwith to institute a complete and searching inquiry. It seems indispensable that the House should be informed, before the Post Office Estimates for the current year are voted, how such things have been possible in the past, and what steps are proposed to make them impossible hereafter.

"They accordingly recommend that the Treasury should lay before them a full statement of their proceedings in this matter, which they propose to submit for the consideration of the House in a future Report.

"The Controller and Auditor-General calls special attention to the fact that the whole expenditure for materials has been transferred to capital. Mr. Scudamore in answer to question 521, explains that the amount of materials legitimately to be borne by revenue has, as yet, been extremely small, but hereafter the case will be very different.

"The Controller and Auditor-General proposes to disallow the transfer of 40,157*l.* 13s. 10d. from the vote to capital in respect of 'way leaves,' &c. It appears that this service is very imperfectly thus described, and that the true heading should have been 'compensation to railway companies for surrender of their revisionary interests in telegraph business, including way leaves.' Your Committee agree to this proposal, and in the other corrections which have been made in the account by the Auditor.

"The net deficit to be voted will accordingly be 171,775*l.* 18s. The amount of this deficit is owing to the great, rapid, and unforeseen extension of the telegraph business during the past year."

DEATH OF M. CHARLES LENDI.

The *Journal Telegraphique* contains an obituary notice on the late M. Lendi, Chief of the Swiss telegraphic system, and Director of the International Bureau of Telegraphic Administration at Berne. M. Lendi was a gentleman of the highest character and of considerable ability. In his death, which occurred January 12, 1873, the telegraphic service of Switzerland has sustained a loss that will not be readily repaired. We condense:

"M. Lendi, although of Swiss descent, was born in Paris, in 1825. His father removed to Lucerne at the time of the Revolution in 1830, and it was in the schools of the latter city that he received his education. When seventeen years of age he entered the military service and served for several years with distinction. When the telegraph was first introduced into Switzerland, M. Lendi found in its service a congenial field for his activity and intelligence, and accordingly entered it. In a few months he was appointed chief of service at Schuytz, and subsequently at Lucerne. The following year he was employed by the Government of Piedmont to set up the Morse apparatus and instruct the employés in the use of that system, then first introduced into Italy. In 1857 he was appointed Inspector of the Lausanne Telegraph District, which position he filled until 1864, when he was made assistant director of the Swiss telegraphic system. In 1869 he was promoted to the position of director-in-chief, which he occupied at the time of his decease. In the latter part of 1869, the directorship of the International Bureau being vacant, he consented to fill it temporarily, and, as representative of the Bureau and of the Federal Government, attended the telegraphic conference at Rome in 1871."

RAILWAYS AND TELEGRAPHS IN RUSSIA.—From a recent chart just published, Russia is shown to possess railways and telegraph lines actually in operation which the world outside seem to know very little about; at least it is asserted that the German military authorities were quite surprised not only at the number of miles constructed, but the strategical system developed. Ten lines of railways radiate from the principal lines, uniting in St. Petersburg, Moscow and Kieff, and extend even to the Asiatic frontier. All the military centers are accessible by rail, and in a short time Russia can move large bodies of troops, and concentrate them within a few days at any desired spot.

THE *Industrial Age* states that Philadelphia and New York capitalists have taken a large amount of stock in the Loomis Ærial Telegraph project.

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OBSERVATIONS ON THE DURATION AND MULTIPLE CHARACTER OF LIGHTNING FLASHES.

Arago has classified the different forms of lightning under three heads: 1st, linear zig-zag flashes; 2d, flashes appearing as a broadly diffused light (sheet lightning, heat lightning), and, lastly, the rarely occurring discharges which are seen as slowly moving balls of fire. The first form is due to the production in the atmosphere of a gigantic electric spark, and the majority of physicists and meteorologists suppose that flashes of the second form are due to the same cause, their light being seen either by transmission through or reflection from the clouds.

Professor O. N. Rood, of Columbia College, communicates to the *Journal of Science and Arts* an interesting paper detailing observations made by him on the nature of lightning flashes. The apparatus used was a small train of toothed wheels, driven by a spring so that it should be capable of rotating a circular paste-board disk which was provided with four open sectors. On examining lightning flashes of the second form with this rotation apparatus, it was found that each flash consisted of a considerable number of isolated and apparently instantaneous electric discharges, the interval between the components being so small that they constituted a continuous act.

From the observations made, Professor Rood concludes that the nature of the lightning discharge is more complicated than has been supposed; it is usually, if not always, multiple in character, and the duration of the isolated constituents varies very much, ranging from intervals of time shorter than one sixteen-hundreth of a second up to others at least as great as one-twentieth of a second; and, furthermore, a variety of the latter kind may sometimes be found in the components of a single flash.

In the examination of the spectrum of lightning by Dr. Vogel, a number of lines were identified as also occurring in the spectrum of the electric spark in the ordinary atmosphere; but what is remarkable, it was found that sometimes the spectra consisted of bright lines on a dark ground, while at others bright lines were traced on a less bright continuous spectrum, and, finally, sometimes a continuous spectrum, destitute of lines, was obtained. The discharges were principally of sheet lightning. Professor Rood considers that the continuous spectra, destitute of lines, were due to the prolonged constituents above referred to; and the occurrence of bright lines on a less bright ground, he refers to cases where instantaneous and prolonged constituents were noticed by himself, the normal spectrum of bright lines on a dark ground being produced by flashes more nearly instantaneous. It is also believed that zig-zag, heat, and sheet lightning are really identical, being in point of fact due to the same cause, but viewed under different conditions.

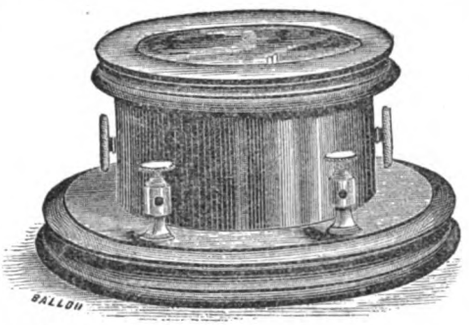
From the study of lightning flashes, the author recommends a black or gray opaque disk about 3·9 inches in diameter, with one open sector. The best form for the shortest and longest durations is that of a square, with sides of from 0·27 to 0·39 inch; for examining the multiple character of flashes, simply a long narrow sector of 1° or 2° is preferable. A spring rotation apparatus may be used, so as to admit of rotation up to twenty or thirty per second.

M. A. Boillot describes the method for preparing ozone, by bringing oxygen in the vicinity of electricity passing through broken or pulverized gas-carbon contained in a tube.

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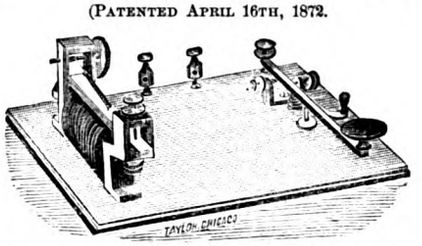
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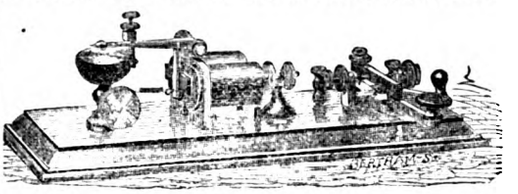
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 11. NEW YORK, MAY 1, 1873. WHOLE NO. 132.

HOLTZ'S ELECTRICAL MACHINE.

In the electrical machines described in our last issue, electricity is produced by the friction of one substance against another. Quite recently several machines have been invented of quite a different kind, in which a body is electrified once for all, and made to act by induction upon a movable system in such a way as to produce a continual generation of electricity. The most successful of these is that invented by Holtz, of Berlin, in 1865. (Fig. 1.)

It contains two thin circular plates of glass, one of which (A) is fixed, while the other (B), which is rather smaller, can be made to revolve very near it. In the fixed plate there are two large holes or windows, near the extremities of its horizontal diameter. Across these, and partly covering them, are glued two paper bands or armatures, having points *f*, *f'* directed the opposite way to that in which the movement takes place. Two metallic combs, P, P', are placed opposite the windows, on the other side of the revolving plate, and are connected with two insulated conductors terminating in the knobs *n*, *m*, which may be called the poles or electrodes of the machine. These knobs can be set at any distance asunder. In starting the machine, they are placed in contact; and one of the armatures, suppose *f*, is electrified by holding against it a sheet of vulcanite which has been charged with negative electricity by friction. The plate is then turned for a few seconds, and the two knobs are gradually separated.

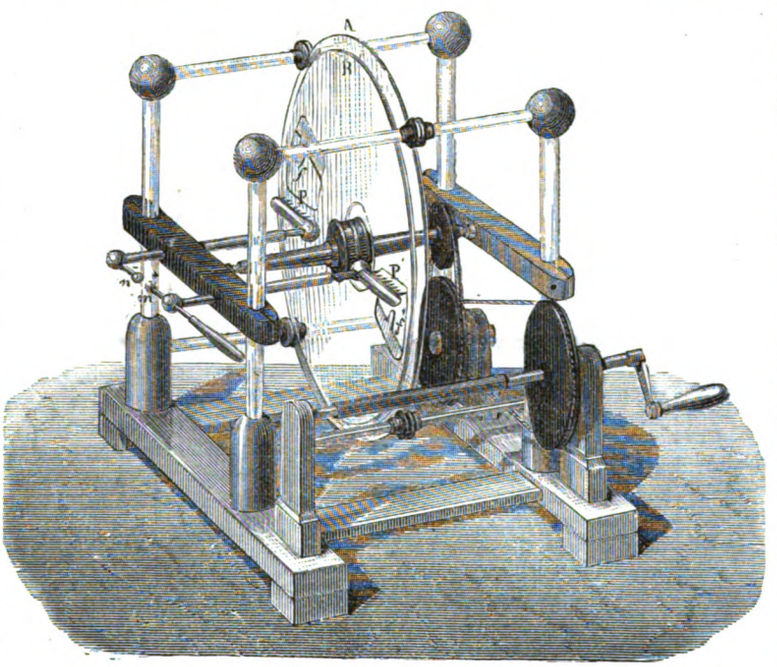


Fig. 1.

A continuous crackling noise is immediately produced at the place of separation, resulting from electric discharge across the interval. In the circumstances supposed, the knob *n* is the negative, and the knob *m* the positive electrode. In dry weather, the machine, when once started, will continue in action for a long time if the motion is kept up, but it soon ceases to act if the air is damp, being even more sensitive to moisture than the ordinary machine.

The action of the machine is as follows: The negative electricity of the armature *f*, acting inductively on the opposed conductor, from which it is separated by the revolving plate, causes this conductor to discharge positive electricity through the comb upon the face of the plate, and thus to acquire a negative charge. When the part of the plate which has been thus affected comes opposite the other armature, the latter is affected inductively, and discharges negative electricity through its point *f'* upon the back of the plate, thus becoming itself positively electrified. Positive electricity from the front of the plate is, at the same time, collected by the comb P', an equal quantity of negative being of course discharged from the comb upon the plate. In the subsequent stages of the process, the negative electricity thus discharged upon the face of the plate exceeds the positive which was previously there, so that the face of the plate passes on with a negative charge. When the portion of the plate which we are considering again comes opposite *f*, it increases the negative electrification both of the armature and the conductor, inasmuch as it has more of negative or less of positive electricity upon both its surfaces than it had when it last moved away from that position. Both armatures thus become more and more strongly electrified, until a limit is attained which depends on the goodness of the insulation; and as the electrification of the armatures increases,

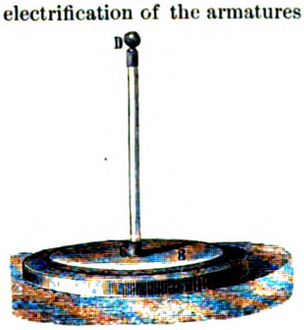


Fig. 2.

the conductors also become more powerfully affected, and are able to discharge to each other by the knobs *m n* at a continually increasing distance.

The inventor has recently introduced a modified form of his machine. The plates are placed horizontally; they have neither windows nor armatures, and they both revolve, but in opposite directions. Two conductors, furnished with rows of points, are placed above the upper plate at the extremities of one diameter, and two others below the lower plate at the extremities of another diameter perpendicular to the former. Each of the upper conductors is connected with one of the lower, so that there are virtually only two conductors. In starting the machine, a sector of electrified vulcanite is held over the upper plate, opposite one of the lower combs. When the machine has been turned for a few seconds, the sector may be removed, and a continual discharge of sparks takes place between the two knobs which are connected with the two conducting systems. Frequently a comb is placed above, opposite to the lower comb, and this arrangement appears to increase the efficiency of the machine.

The action in this form of the machine also depends upon induction, the conductors performing the duty of armatures as well. We shall not enter into details, but merely remark that, in both forms of the machine, work is spent in turning the plates in opposition to electrical attractions and repulsions, and that the mechanical energy thus consumed produces an equivalent in the form of electrical energy.

When electricity is required in comparatively small quantities, it is readily supplied by the simple apparatus called the *electrophorus*. This consists (fig. 2) of a disc of resin, or some other material easily excited by friction, and of a polished metal disc B, with an insulating handle C D. The resin disc is electrified by striking or rubbing it with catskin or flannel, and the metal plate is then laid upon it. In these circumstances, the upper plate does not receive a direct charge from the lower, but, if touched with the finger (to connect it with the earth), receives an opposite charge by induction. On lifting it away by its insulating handle, it is found to be charged, and will give a spark. It may then be replaced on the lower plate (touching it at the same time with the finger), and the process repeated an indefinite number of times without any fresh excitation, if the weather is favorable.

The resinous plate has usually a base or *sole* of metal, which is in connection with the earth while the electrophorus is being worked. This sole, by the mutual induction which takes place between it and the upper plate or *cover*, increases the capacity of the latter, and thus increases the charge acquired. When the cover receives its positive charge on being connected with the earth, the sole at the same time receives from the earth a negative charge; and as the cover is gradually lifted, this negative charge

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gradually returns to the earth. The most convenient form of the electrophorus is that of Professor Phillips, in which the cover, when placed upon the resinous plate, comes into metallic connection with the metal plate below. That this arrangement is allowable is evident, when we reflect that, when the upper plate is touched with the finger, it is in fact connected with the lower plate, since both are connected with the earth; and it effects a great saving of time when many sparks are required in quick succession, for the cover may be raised and lowered as fast as we please, coming alternately into contact with the resinous plate and the body which we wish to charge.

THE INVENTION OF THE LEYDEN JAR.

Certain parts of works on physical science, written a century or more ago, are at the present day sometimes very interesting to read on account of the expressions of delight indulged in by the authors, on matters which, at present, are considered of a trifling interest with what is now known in regard to the sciences of nature. Priestley, in his "History of Electricity," published in London, 1767, says; "The end of the year 1745, and the beginning of 1749, is celebrated by reason of the most astonishing discoveries which have ever been made in the whole field of electrical science, namely, the wonderful condensation of this force in a glass named the Leyden jar, because it was first made by Cuneus, of Leyden, while experimenting with Professor van Muschenbroek," etc.

The history of the discovery of that form of electric induction on which the invention of the Leyden jar is founded, is thus given by Desaguillers: "Professor van Muschenbroek, of Leyden, Holland, and some of his friends, observing that electrified bodies, exposed to the air, lost their electricity rapidly, imagined that, if they inclosed a conducting body in a non-conductor, it would become possible to charge more electricity into the conductor and retain it longer. As a glass bottle was the most convenient non-conductor, and water the most common conductor, water was placed in a bottle, a brass rod put in the water, and the same charged by the intervention of this rod; but nothing particular was observed till Mr. Cuneus, who supported the glass flask by his left hand while it was being charged, supposing that the water had received as much electricity as it could contain, attempted to withdraw the brass wire with his right hand, when he was suddenly frightened by a violent shock in his arms and chest." The water served here for the inner coating of the jar, and his left hand for the outer coating; and yet, however simple and easily repeated the experiment is, there were at that time many experimenters who, after reading the published accounts, and trying it for themselves, did not succeed, being still in the dark about the conditions required for success, which at the present day are so well known.

It has been proved that the discovery of the same principle, and its application by Von Kleist, in Germany, in the same year, was without knowledge of the above, each investigator working independently of the other. Those who succeeded gave the most exaggerated account of their feelings. Professor Van Muschenbroek, who made the experiment with a flask of very thin glass, and therefore obtained a most powerful charge, declared in a published letter that he was so violently struck in his arms, shoulders, and chest, that he lost his breath, and two days elapsed before he was recovered from his fright. He adds that he would not submit to a second shock for the whole kingdom of France.

M. Allamand made the experiment with a common glass tumbler, and says also that the shock took his breath away; that he felt such a violent pain in his arms as to fear serious consequences, but that it passed over without injury to him. Winckler, of Leipeic, tells another story. He says that when he first performed the Leyden experiment upon himself, he felt strong convulsions over his whole body; his blood was brought into a most violent agitation, and a burning fever would have been the result if he had not taken cooling medicines. He felt also a heaviness in his head, as if a large stone laid upon it; it caused him twice to bleed at the nose, which otherwise seldom took place. His wife appears to have been of an investigating turn of mind, and much less afraid than he; she took the shock twice, but Winckler says she was then so weakened that she could not walk, and a week later, having obtained the necessary courage to give her another shock, she commenced at once to bleed from the nose.

But everybody was not so foolishly frightened, M. Bose, with a truly philosophical courage, worthy of Empedocles, wished to be killed by the electric shock, in order that the account of his scientific death might procure an article for the Memoirs of the French Academy of Sciences, but his wish was not fulfilled.

The electric shock produced by the Leyden jar attracted then so much general interest that many persons traveled around Europe and made a living by administering it, some of them pretending to cure by it all kinds of diseases.

Foremost of those who advanced this branch of science must be mentioned Gralath, in Germany, who, in 1746, gave the shock at great distances, and through twenty persons at once, and invented the electric battery, consisting of a number of Leyden jars. Finally, Drs. Watson and Bevis, according to the *Philosophical Transactions*, found the modern method of covering the outside of the jars with tinfoil, while the first connected several separate masses of combustible fluid, with metallic wires, and ignited them all with the same spark. After accounting for many other experiments, he says, in a prophetic style; "Notwithstanding the many great discoveries made during the latter years in this branch of natural sciences, posterity will consider our knowledge to be in its infancy; therefore we must, in so far as experiments justify us, be ready to modify or abandon our conclusions as soon as other more probable theories are proposed."

Another investigator, quoting these words fifty years later, says: "Considering the rapid progress since that time, we may hope that even the so enormously advanced science of the present day (1795) will, at some future time, be looked upon as merely in its infancy."

THE great globe which we inhabit is itself a magnet. On the one side of the magnetic equator, the north end of the needle dips; on the other side, the south end dips, the dip varying from nothing to ninety degrees. If we go to the equatorial regions of the earth with a suitably suspended needle, we shall find there the position of the needle to be horizontal. If we sail north, one end of the needle dips; if we sail south, the opposite end dips; and over the north or south terrestrial magnetic pole the needle sets vertical. The south magnetic pole has not yet been found, but Sir James Ross discovered the north magnetic pole on the 1st of June, 1831.—*Faraday.*

ON A NEW RELATION BETWEEN HEAT AND ELECTRICITY.

BY FREDERICK GUTHRIE.

It is found that the reaction between an electrified body and a neighboring neutral one, whereby the electricity in the neutral body is inductively decomposed and attraction produced, undergoes a modification when the neutral body is considerably heated.

Under many circumstances it is found that the electrified body is rapidly and completely discharged. The action of discharge is shown to depend mainly upon the following conditions:—(1). The temperature of the discharging body, and its distance from the electrified one. (2). The nature (+ or —) of the latter's electricity.

With regard to (1), it is shown that the discharging power of a hot body diminishes with its distance and increases with its temperature. But, concerning the temperature, it is proved that the discharging power of a hot body does not depend upon the quantity of heat radiated from it to the electrified body, but chiefly upon its quality. Thus a white-hot platinum wire connected with the earth may exercise an indefinitely greater discharging power, at the same distance, than a large mass of iron at 100° C., though the latter may impart more heat to the electrified body.

Neither the mere reception of heat, however intense, by the electrified body, unless the latter have such small capacity as to be itself intensely heated, discharges the electricity if the source of heat be distant, nor is discharge effected when the electrified body and a neighboring cold one are surrounded by air through which intense heat is passing; but, for the discharge, it is necessary that heat of intensity pass to the electrified body from a neutral body within inductive range.

White and red-hot metallic neutral bodies exercise this discharging power even when isolated from the earth, but always with less facility than when earth-connected.

The hotter the discharging body, whether isolated or earth-connected, the more nearly alike do + or — electricities behave in being discharged; but at certain temperatures distinct differences are noticed. The — electricity, in all cases of difference, is discharged with greater facility than the +.

It is shown that various flames, both earth-connected and isolated, have an exceedingly great power of discharging both kinds of electricity.

The effects in regard to discharge are shown to be similar when platinum-wire, rendered hot by a galvanic current, is used, and also when the condensed electricity of a Leyden jar is experimented on.

As hot iron shows a preferential power of discharging — over + electricity, so it is found that white-hot, but isolated, iron refuses to be charged either with + or — electricity. As the iron cools, it acquires first the power of receiving —, and afterwards of receiving +. Further, while white-hot iron in contact with an electrified body prevents that body from retaining a charge of either kind of electricity, as it cools it permits a + charge to be received, and subsequently a — one.

A suggestion is made as to the existence of an electrical coercitive force, the presence of which, together with its diminution by heat, would explain much of what has been described.

THE heathen Chinee's ideas of the uses and habits of deep-sea telegraphic cables are rather peculiar. Some of these innocent Confucians make a living by fishing up the wires, cutting them, and selling the pieces. Occasionally they vary their dark ways by resetting the cable like a verbena or a geranium, in order that it may grow and serve for future provision.

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TELEGRAPH POLES.

In India, Central Asia and Australia, where great telegraph lines have been erected, iron poles have been especially made, which have answered all constructional requirements and which has since proved to be the most economical means of carrying wires above ground.

On the application of iron to this purpose, Major Webber lately read a paper before the Society of Telegraph Engineers in England, in which he adverted to the different forms of metal poles proposed. Some are constructed like railway signal posts, others like split tapered tubes, telescopes, lattice and ribbons. Others again have been made of multiple iron bars of T and H sections or of cast and wrought iron tapered tubes, connected by socket joints. As a general rule no one design is applicable to all situations, for on ordinary roads the mathematical curves of a railway are not met with, but, in their stead, every abrupt angular change or tortuous winding. The poles should be strong enough to carry the weight of the wire at the requisite height from the ground without bending, and rigid enough to resist the pressure of wind. When placed in the ground straight, they will require no side support, but when at an angle they will hardly resist the lateral strain due to the wires. A wooden pole, unless placed so as to partially convert strain into thrust, cannot long resist strain with the resistance furnished by the ground alone. The difficulty lies, not in making a pole with the necessary strength, but in obtaining a sufficiently unyielding mass to hold it upright against the horizontal strains to which it is subjected.

Lieutenant Jekyll, R. E., having analyzed the forces to which poles are subject, considers a stay superior to a strut in affording support. Where stays or struts cannot be fixed at the same height as the wire, it is better to attach them above than below it. An iron loop at the arm bolt would form a good means for the attachment of a stay; the loop should be put on inside the arm and be galvanized. The defects of struts are sometimes remedied by anchoring or foot-staying the pole and by bracing the pole and strut together in the middle with twisted wire; though even this precaution does not prevent the top from bending.

When local circumstances preclude the use of either stays or struts, trussing may be employed with advantage. The pole for this purpose is supported horizontally by a crutch at each end, in which position it sags slightly in the middle. A block of wood about two feet in length and the same thickness as the pole, is halved into and spiked to the butt of the poles at right angles to its length. A spur about one foot in length is fixed on the side of the pole, half way between the ground line and the top. An ordinary stay rod is grooved into the side of the butt and passed through the block at the bottom, and an iron hoop is attached to the bolt of the top arm. A twisted wire stay is then made between the loop at the top and the eye of the stay rod at the bottom, which, when tightly secured, is stretched over the spur as a bow is drawn. It will then be found to be quite tight and to impart a slight bend to the pole, which can be further increased, if required, by screwing up the nut at the end of the stay rod. The block at the bottom may be bolted side by side to the pole, and a four-armed spur is recommended. The trust wire must be placed on the same vertical plane with the resultant of the wire strains. The ground, and especially near the foot, where blocks should be used, must furnish the necessary support. In cases of withstanding exceptional pressures, double or A poles are sometimes used.

Mr. W. Siemens considers that in the employment of iron poles a buckled wrought iron foot-plate is of advantage, as affording a much firmer foundation. The portion of the post which is partly buried in the ground and therefore exposed to the simultaneous action of moisture and air, is made of cast iron and is of tubular form. This tube is fastened to the buckled plate by means of four bolts, and is provided at its upper end with a suitable pocket to receive the upper tube, which is made of wrought iron. The shape is approximately parabolic. The tubes are cemented with a mixture of sulphur and oxide of iron. 180,000 poles, thus arranged, have been erected by the Messrs. Siemens in South America, with satisfactory results. They are not as cheap as wooden poles in the first outlay, but are of course not subject to dry rot.

NEW MAGNETO-ELECTRIC MACHINE.

We have had an opportunity of witnessing the trial of a magneto-electric machine, which appears to be likely to give satisfactory results, says the *Engineer*. It consists of a row of modified horse shoe electro-magnets, surmounted by another row of inverted similar electro-magnets, the poles consequently being face to face, but of course separated by a space. In the central space there revolves a drum carrying the armatures, one armature being supplied to every pair of magnets. The armatures are simply rings or hoops of soft iron, surrounded by a number of helices containing wire. The ends of the wires of each helix are brought down to the shaft of the drum, each insulated from the other, and thence the currents are collected in the usual way. Pieces of iron attached to the poles of the magnets partly embrace without touching the armatures. In the machine in question there were three armatures, one of which was sufficient to excite all the magnets by means of the induced current, as above described, and the other two were sufficient to provide a powerful current, which gave an excellent light in one of Mr. Ladd's lamps. The power required to drive the machine was about 3½ or 4 horse.

Lenz's Law.—Considering the induction effects produced by the motion of a wire through which a current is passing upon another wire formed into a closed circuit, Lenz was led to give the following law, which is known by his name: "Whenever a relative displacement takes place between a current and a closed circuit in the natural state, the latter is traversed by an induced current, which reacts so as to determine a motion in the opposite direction—or, what comes to the same thing, which is opposite to the current that would produce the same displacement." Thus, when we diminish the distance between two parallel wires, one of which transmits a current, the other forming a closed circuit, we obtain in the latter an inverse current; and we know that two parallel currents in opposite directions repel one another.

Powerful Electro-Magnets.—M. Jamin of Paris has exhibited to the French Academy an artificial magnet, weighing 4-4 pounds, of which the carrying force is 99 pounds. This result has been gained by substituting very thin leaves, thoroughly magnetized—to saturation, as the inventor expresses it—for the thick plates formerly used in constructing electro-magnets.

An idea of the magnitude of the power thus obtained may be gathered from the fact that, although some natural magnets have carried loads of twenty times the sustaining capacity of the best artificial magnets, has not exceeded four or five times their weight. The practical application of M. Jamin's discovery will be to diminish, in an immense degree, the volume and weight of the magneto-electric machines for the production of light and electricity.

ON THE INDUCTION OF ELECTRIC CURRENTS IN AN INFINITE PLANE SHEET OF UNIFORMLY CONDUCTING MATTER.

By Prof. Maxwell, F.R.S.

The currents are supposed to be induced in the sheet by the variation in position or intensity of any system of magnets or electro-magnets.

When any system of currents is excited in the sheet, and then left to itself, it gradually decays, on account of the resistance of the sheet. At any point on the positive side of the sheet, the electro-magnetic action is precisely the same as if the sheet with its currents, retaining their original intensity had been carried away in the negative direction with a constant velocity R, where R is the value in an electro-magnetic measure, of the resistance of a rectangular portion of the sheet, of length 1 and breadth 2 in. This velocity, for a sheet of copper of best quality of one millimetre thickness, is about twenty-five metres per second, and is, therefore, in general comparable with the velocities attainable in experiments with rotating apparatus.

When an electro-magnet is suddenly excited on the positive side of the sheet, a system of currents is induced in the sheet, the effect of which on any point on the negative side is, *at the first instant*, such as exactly to neutralize the effect of the magnet itself. The effect of the decay of this system of currents is therefore equivalent to that of an image of the magnet, equal and opposite to the real magnet, from the position of the real magnet, in the direction of the normal drawn away from the sheet, with the constant velocity R.

When any change occurs in an electro-magnetic system, whether by its motion or by the variation of its intensity, we may conceive the change to take place by the superposition of any imaginary system upon the original system; the imaginary system being equivalent to the difference between the original and the final state of the system.

The currents excited in the sheet by this change will gradually decay, and their effect will be equivalent to that of imaginary system carried away from the sheet with the constant velocity R.

When a magnet or electro-magnet moves or varies in any continuous manner, a succession of imaginary magnetic systems like those already described is formed, and each, as it is formed, begins to move away from the sheet with the constant velocity R. In this way a train or trail of images is formed, moves off, parallel to itself, away from the sheet, as the smoke of a steamer ascends in still air from the moving funnel.

When the sheet itself is in motion, the currents, relatively to the sheet, are the same as if the sheet had been at rest, and the magnets had moved with the same relative velocity. The only difference is, that whereas when the sheet is at rest, no difference of electric potential is produced in different parts of the sheet, differences of potential, which may be detected by fixed electrodes, are produced in the moving sheet.

Pneumatic Despatch.—In the application and employment of pneumatic despatch tubes, for the transmission of despatches from the various telegraphic posts to the central office, in Paris, MM. Mignon and Rouart have utilized, for the compression of the air, the force generated by the pressure of water in the service pipes, with considerable economy. The cubical contents of the reservoirs provided is three times the capacity of a kilometre of pipe. The cost of water for the transmission of a train of 500 despatches through a distance of one kilometre is about 25 centimes (2½d).

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CORRESPONDENCE.

To the Editor of the Journal of the Telegraph:

With your permission, a word in regard to the proposed change of alphabet.

Most certainly any change of the kind proposed can but be injurious in the extreme, and would seem to have originated in nothing higher than that most miserable of all American ideas—that of aping and worshiping European ways and fashions.

What matter to us if our alphabet is not universal? It is American, and is the pioneer of all. Morse invented the telegraph, and Europe endeavored to rob him of it, but failed. Morse invented our alphabet to perfect his first invention; and this same alphabet has, I doubt not, been the means of transmitting a greater amount of intelligence and correspondence, in the past ten years, than has been transmitted over all the wires using the "English," "Continental," "International," or whatever high-sounding name they may give it, since its first adoption. And we are asked to discard our good old Morse and adopt the foreigner, merely that we can be, as the Pharisee thanked God he was not, as other men are. Why not propose that Americans use burnt cork as an article of the toilet, merely because the people of Africa are black? We have as much occasion for African color as for European alphabets in our telegraphy. The idea that it is to get clear of spaced letters is all bosh. If not, why not substitute other characters for spaced letters and leave others undisturbed? Why use the J character for C, and F for R, and so on, thus compelling an old operator to learn to look on white as black and black as white?

Have the proposers of this matter considered what they are asking?

Consider the number of operators using the Morse to whom an error in transmitting or receiving seems almost an impossibility, and on whose brain the characters of the Morse are branded as with an iron and as firmly rooted as the words of a person's mother tongue. Are these men all to be sent back into the primary school of telegraphy? And think you they can ever become again greater than mediocre? Do not deceive yourselves till it is too late. This alphabet is to them as is the mother tongue, which is the only tongue a person can ever speak in purity and perfection. It will always interfere with any new language to be accomplished, to an extent that will cause the most persevering and accomplished student to rate, in the pronunciation of any new language he may acquire, far below persons of scarcely any education, but whose mother tongue such language is. Did you ever know the most accomplished foreigner, French, German, Italian, or what not, who, after twenty or even thirty years' residence in this country, could so speak the most common sentence that the most casual listener would not recognize his foreign accent, and probably pronounce his nationality?

Change the alphabet and telegraphy in this country is checked for at least five years, by reducing the first-class operators and "plugs" to the same level, while other countries maintain their onward march.

Turn your backs upon the "plugs," or send them back to school, and no change will then be needed.

The telegraph companies of this country will pay more damages from errors of operators now ranking first-class, within the first year after such change takes effect, all caused by confusing the characters of the old and new, than they have paid in any five from blundering of "plugs" with spaced letters.

In conclusion, I would ask how many operators who cannot write spaced letters correctly would be able to write legibly the following simple message with the "Continental" alphabet?

"*To John Morton, 109 West 28th St., New York City: Meet mother at depot to-morrow morning at ten* (10) *o'clock.*

(Sig.) THOMAS MORGAN."

Show me an operator who cannot write distinctly any word of spaced letters such as "*error*," "received," "receipt," "record," or any other, and I will show you in the same individual a "plug" who cannot with the "Continental" write the commonest word in the English language, *i. e.* the word "*common.*"

AMERICUS.

FRANCISVILLE, MD., April 5th, 1873.

To the Editor of the Journal of the Telegraph:

I notice in your issue of March 15th a great deal in reference to a change in alphabet, and various good reasons for the change.

However, I see none offered which are calculated to effect the desired result; and as it is a matter of importance, or at least interest, to every telegrapher, I offer my opinion, which, if not very important, accords with my experience and that of many of us with whom I have conversed upon the subject. In the first place I regard our present alphabet as superior to the "European alphabet," even with its spaced letters, and although "the spaced letters" are the cause of many of the errors in copying, they can not be more so than would some of the clumsy letters in the "European alphabet."

There is a necessity for a change; yet why could not our alphabet be improved, and let others adopt ours instead of us adopting an alphabet which is extremely "clumsy" and no improvement upon ours whatever?

R. L. M.

To the Editor of the Journal of the Telegraph:

If the only object in changing the alphabet would be to get clear of the spaced letters, why not substitute characters entirely new for them only? Could they not be learned more readily and with *less risk* of making mistakes, than adopting a new alphabet, or changing, in any way, our good old Morse characters; and are not characters such as - — - - - - - — - - - - -

to substantiate my assertion that they come from careless and incompetent operators. What the Company desires is accuracy and speed in the transmission of business, and I think we have more of these qualities in our alphabet than we get in the European; for instance, take their letters that contain a number of dashes, and use them where the ends with the dashes connect, and I am sure it will take a longer time to transmit them accurately than it would with our spaced letters, and at the same time be as liable to make mistakes (if not more so) than with our spaced letters. The idea suggested by "H." that it would be a trifling matter to make the change, and only take two weeks, is absurd, as I think that the mistakes and delays that would necessarily follow would injure the Company more than all the "bulls" that would arise from our spaced letters in half a century.

I will admit that there may be room for improvement in our alphabet, as far as spaced letters are concerned; and if any change should ever be made, it should be confined to those alone. Let the change be as limited as possible, and it will cause more or less confusion, and the less the better. The Company has done well, and is doing well, and its prospects are brightening every day. Mistakes occur in all kinds of business, and there are losses to corporations, and always will be as long as there is business done. And I think that the losses that the Company sustain from the source my friends H. and H. H. W. speak of, or have reference to, would not be a drop in the bucket, compared with losses of other corporations. And still they are powerless to prevent them, do what they may; and sometimes what they think will remedy the matter only makes it worse. So what is the use of swapping horses unless you are *certain* that you are going to get one that will answer your purpose better in every respect than the old and tried ones. And I am confident that the majority (and a large one) of the operators prefer the alphabet as it is. E. A. T.

WINTHROP, Me., April 12, 1873.

To the Editor of the Journal of the Telegraph:

About the end of the year 1857, Mr. Culley, then Division Superintendent of the Electric and International Telegraph Company, at Edinburgh, (Scotland,) issued an order to the effect that a fortnight hence the Morse instrument would be substituted for the Double Needle instrument, on all long and important circuits running into that office, and that clerks who could work the new instrument would be promoted at once.

We had served an apprenticeship in the Double Needle alphabet, and, taking the staff on an average, could read 45 words per minute—50 per minute had been frequently acquired on reports during the Crimean war, and on one occasion, on a speech delivered by John Bright at Glasgow, (Scotland,) a certain clerk had averaged 60 words per minute for upwards of two hours—and, all being good clerks, we were much prejudiced against what we deemed an innovation.

Nevertheless we set ourselves to the task, and at the end of the fortnight only one man was disqualified, and he is now Train Dispatcher on the C., B. and Q. R. R., and a first-class Morse operator.

If a change of alphabet is really necessary, (and I think it certainly is,) I am satisfied that a fortnight's notice is sufficient for the majority of operators; and as for the rest, let them go. Those space letters ARE a nuisance. If all operators were A1 there would be no need of alteration, but they are not. A telegraphic alphabet should be composed so as to be as near as possible to perfection, to suit the majority. WINTHROP.

SALISBURY, MD., April 9th, 1873.

To the Editor of the Journal of the Telegraph:

On the proposed change of Telegraph Alphabet: Why do we want a change? where is the need of it? and what is the trouble with the present good old "Morse?"

I have read where some one has said, to "secure more perfect accuracy," to "secure speed," &c., &c. Well, if a competent operator be placed at each end of a wire, and its sender writes good "Morse," how and by what means can you secure anything more plain or accurate? Just as fast as the fastest penman can get it scrawled down. I will wager a month's pay, if the matter could be tested, the W. U. Tel. Co. has in its employ plenty of men who can send, or receive, faster, and with more accuracy, with the old "Morse," than any Englishman, Frenchman, Dutchman or Spaniard, that can be found in all the land of their respective countries—with their Dutch alphabet.

To illustrate: - - - - - - - - - - —. What is plainer? Among the first words a student learns to catch. But imagine — - — —, — — —, - - —. The call of my office is "Sy" - - - - - -; a very pretty, neat and appropriate call. But just listen to a fellow plugging away thus - - -, — - - —. And then the numerals—worse than ever. This is not so much an item to commercial operators, but with us R. R. Operators it is a matter of great importance. For instance, Car No. 2009 - - — - -, —, —, — - - —, (- - — — —, — — — —, — — — — —, — — — —). I pity a poor paper operator, unless he has plenty of room for his paper to run, and plenty of time to count out dashes.

We are not going to plead inability or unwillingness to learn the new alphabet, when it has really been shown a necessity and advantage (but we think it an absurdity to talk about this being an improvement), and if it becomes an international necessity.

It has been some five or six years since I worked in a city office, and am not probably up to the fast age in which we live—but, to express a countryman's views, I don't see the international necessity.

Have you any records of fastest time accomplished by any of our cousins across the waters, with this *dashed up* alphabet? And how does it compare with our record of 42 to 52 words per minute?

AMERICA.

To the Editor of the Journal of the Telegraph:

The phrase "a universal alphabet" sounds well, but who would exchange for the name? Count the cost for a high-sounding title. Merit is the real question. There is nothing in the "Morse" objectionable, unless it is the spaced letters. But why should we transfer so many letters and substitute so many new combinations in the alphabet, and exchange all the numerals for characters very much more clumsy, saying nothing about the punctuations; all this for the purpose of getting rid of the spaced letters? How absurd.

Some maintain that a change is unnecessary; that if operators were required to "write Morse" the point would be settled. Does any one expect to live to see the time when a Board of Examiners will be resorted to, or suppose that an executive order would reach the difficulty. He who looks for remedy aside from a change in the alphabet, looks in vain. A change is the most certain way of reaching the evil, so far as relates to the spaced letters.

As to the wretched formation of other characters, a change in alphabets would avail nothing.

No doubt many who write carelessly can write well; others are constitutionally defective, perhaps nervous system shattered, but a still larger class of bunglers are those whose early training at the key has been neglected. This is certainly a matter of great importance. Teachers should see that their students make every letter perfectly, and space properly between letters, and also between words. The teacher is undoubtedly responsible for the manner in which the characters are formed, until the student is sufficiently advanced to realize the necessity for the great care that should be thus exercised. Many, from ignorance and lack of proper instructions, fall into a shuffling habit of writing which becomes next to impossible to correct.

There are many operators who have no difficulty worth mentioning with the "Morse." It is absurd to say that operators of the present day will not compare favorably with those of the past. There may be more inefficient operators now, but what does that prove? Every profession has its "mules," every calling its quacks, and as the number engaged in any calling increases, it is presumed those who have "missed their calling" will increase in number also.

What you or myself might accomplish with "Morse" is of little consequence to the profession. Now and then one may accomplish extraordinary things and be called a clever fellow, especially if he is modest about it. But the question is, what will the masses do?

If change we *must*, pray don't change anything but the "spaced letters." Even that will cause great confusion. W. B.

BLOOMSBURG, April 16, 1873.

To the Editor of the Journal of the Telegraph:

I received a half-rate message about seven o'clock P. M., to be mailed; mail was closed same evening, to start out early in morning. Was I right in mailing it that evening? W. A.

Answer.—It was right to mail it that evening under the circumstances mentioned.

A B C.—Lightning arresters are used in offices to carry off the charges arising from thunder storms, which, without such protection, might cause damage. They can be had by requisition upon your Superintendent.

H. H. MORING.—The question you ask, "What will it cost to build and equip a line twelve miles long," is very indefinite. It depends entirely upon the size and quality of the poles and wire, the number and form of instruments, and the price of labor.

DELAWARE, O.—Messsages of Professors or Students at Universities are to be treated in the same manner as the business of other parties. No one is exempt from the rules of the Company.

AN EMPLOYÉ.—It is correct to count the expressions "Mother's coming," or "Mother's arrived," as two words. Mothers is but one word. The Company does not assume to know the literal meaning of messages offered for transmission.

BEGINNERS.—We do not understand what you mean by the inquiry, "Who has to stand the postage of inquiries, answers," &c.

JACK.—Thanks for your kindness in keeping the JOURNAL posted. The matter contained in your letter, however, cannot be published, for reasons given in our issue of February 1st.

N. W. O.—There is no work published in America which contains an account of all improvements recently developed in electricity and telegraphy, nor, to our knowledge, in any other country. The JOURNAL is a complete record of everything pertaining to the science, and proper attention to its contents will afford as much information as the study of any manual or compendium. Any knowledge at our command is gladly imparted to enquirers.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
May 1, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Evansville, Ala., closed.
Carpenter's Sta., Ala., closed.
Elk Point, Dac., should read 30 2 463 Sioux City, Iowa.
Fargo, " should read 175 12 307 Chicago, Ill.
Vermillion, " should read 50 3 463 Sioux City, Iowa.
Yankton, " should read 75 5 463 " " "
Sioux City Junction, Iowa, changed to Tara.
Sandy Hook, Md., closed.
Hopewell Cross Roads, Md., closed.
Darlington, Md,, re-opened.
An office has been opened at East Cambridge, Mass., square 21; check direct, erase delivery charges.
Renick, Mich., closed.
Saline, Mich., closed.
Escanaba, Mich., should read 100 7 307 Chicago, Ill.
Houghton, Mich., should read 175 12 307 " "
Ishpeming, Mich., should read 150 10 307 " "
L'anse, Mich., should read 150 10 307 " "
Marquette, Mich., should read 150 10 307 " "
Negaunee, Mich., should read 150 10 307 " "
An office has been opened at Pennington, N. J., square 47. Check direct.
Athens, N. Y., re-opened.
Warsaw, N. C., closed.
Sonora, O., closed.
Mifflinburg, Pa., is now an Other Line office; tariff for Other Line 90 and 2 from Lewisburg Junc., Pa.
Millford, Pa., is now a W. Union office, square 46. Check direct.
Birdsboro, Pa., re-opened. Square 59.
58 Gouldsboro, Luzerne Co.. Pa., should read Gouldsboro Sta., Wayne Co. P. O. A. is Sand Cut, Wayne Co.
Almy, Utah, closed.
Bridger's Sta., Utah, Closed.
Echo, Utah, should read 55 4 575 Ogden.
Castle Rock, Utah, should read 55 4 575 Ogden.
Wasatch, Utah, should read 55 4 575 Ogden.
Creston, Wy., should read 75 5 Laramie City.
Evanston, Wy., is now an Other Line office; tariff 55 and 4 from Ogden, Utah.
Fort Steele, Wy., should read 55 4 Laramie City.
Percy, Wy., should read 55 4 " "
Rawlins, Wy., is now an Other Line office; tariff for Other Lines 55 and 4 from Laramie City.
St. Mary's, Wy., should read 55 4 Laramie City.
Separation, Wy., should read 75 5 " "
Washakie, Wy., should read 75 5 " "

NEW OFFICES.

295 Bolling, Ala.
324 Bay Minette, Ala.
67 Kenton, Del.
348 Gillespie, Ill.
396 Mt. Auburn, Iowa.
406 Rock Falls, Iowa.
435 Tara, Iowa.
535 Syracuse, Kan.
446 Wathena, Kan.
251 Douglass, Mich.
* Big Cedar, Mich., 100 7 307 Chicago, Ill.
* Porter, Mich., 100 7 307 " "
Section 32, Mich., 100 7 307 " "
333 Winchester, Miss.
428 Gallaghers, Mo.
447 Harrisonville, Mo.
52 Bernardsville, N. J.
52 Lebanon, N. J.
41 Linden, N. J.
83 Cascade, N. Y.
64 Kasoag, N. Y.
41 Woodlawn, N. Y.
88 Mt. Olive, N. C.
180 Linndale, Ohio.
122 Fairhope, Pa.
84 Lewisburg Junction, Pa.
* West Fairview, Cumberland Co., Pa., 15 1 76 Harrisburg.
480 Elkhart, Texas.
480 Grapeland, Texas.
* Elizabeth Furnace, Va., 65 4 96 Richmond, Va.
* Jackson River, Va., 65 4 96 " "
103 Harper's Ferry, W. Va.
* Amherst, Wis., 75 5 307 Chicago, Ill.
* Fiske, " 50 3 307 " "
* Aspen, Wy., 65 4 571 Bryan, Wy.
Bridger, Wy., 65 4 571 " "
* Carter, " 55 4 571 " "
* Piedmont, Wy., 65 4 571 " "

Offices having "Special Sheet A" will hereafter check Birdsboro, Pa., 25 cents more than "special rate" to Phila., or Harrisburg, Pa. Present rates are not to be increased.

CUBA CABLE.

The Cable to Havana, Cuba, is again working. The extra charge of three dollars per message for "Cuba Cable business," collected during the interruption of the Cable, will hereafter be discontinued.

ATLANTIC CABLE BUSINESS.

The order in JOURNAL of April 1, 1873, giving reduced rates for Atlantic Cable business, is hereby revoked. The following will be adopted instead:

Tariff of Rates, Payable in Gold, to all Points in Great Britain, Ireland and France, to take effect on and after May 1st, 1873.

NOTE.—The 10 word minimum on business to or from Great Britain and Ireland is abolished.

	To Great Britain and Ireland.	
	For each word.	*For ten words.*
From New York City, and all points in Nova Scotia, New Brunswick and New England States	$1.50	$15.00
From all points in New York (except New York City), New Jersey, Pennsylvania, Delaware, Maryland and District of Columbia	1.53	15.30
From all points in Virginia, West Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, Tennessee, Kentucky, Ohio, Indiana, Illinois, Michigan and Wisconsin, from St. Louis, Mo., and from Western Union Company's offices in Florida	1.65	16.50
From all points in Texas, Arkansas, Missouri (except St. Louis), Kansas, Nebraska, Iowa, Minnesota, Colorado, Dacotah, Wyoming, New Mexico, Utah, Idaho, Montana, Nevada, California, Arizona, Oregon and Washington Territory	1.70	17.00
British Columbia	1.85	18.50

NOTE.—*The rates to points beyond Great Britain and Ireland and France*, which have heretofore been computed by adding to the rate to France, will hereafter be found by adding the same amounts to the rate for ten words to London.

The tariff to France will hereafter be $1.25 for twenty words or less, and half this rate for each additional ten words or fraction thereof, in addition to the rate for ten words to London.

The rates to points in Egypt, published in JOURNAL of April 1, 1873, should be added to the rate for ten words to London.

WILLIAM ORTON,
President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, April 24, 1873.

CIRCULAR TO TRANSFER AGENTS AND OFFICES.

Referring to instructions published in JOURNAL of Sept. 16th, 1872, in regard to the cancellation of transfer orders in cases where the payee cannot be found, and in order to cut off unnecessary office messages in such instances, the following additional particulars will be observed:

Upon the receipt of a transfer order, managers are expected to use every effort to notify the payee thereof to call for same—and to continue such efforts, if necessary, for the period of forty-eight hours thereafter. If the rules in regard to "addresses," published in JOURNAL of March 15th, 1873, are strictly complied with, there should be no difficulty in this respect; but if, from any cause, the payee cannot be found within forty-eight hours, upon the expiration of that period, *and not before*, the manager should notify his local transfer agent of the fact by telegraph, stating reasons, &c. This should end the matter so far as the manager of the paying office is concerned, and no further telegraph correspondence should be had upon the subject.

The transfer agent, upon receipt of the manager's message, should at once notify the manager of the receiving office, if within his district, or the transfer agent of the district in which such receiving office is located, that the transfer has been canceled. The manager of the receiving office, upon receipt of such notice, will notify the sender and refund to him the amount of the transfer, retaining tolls and premiums. No further enquiries or explanations should be made on either side for the benefit of the parties concerned, unless such parties guarantee the payment of our regular tolls upon all the messages involved in such enquiries or explanations.

Transfer agents are requested to give their *personal* attention, whenever practicable, to the operation of the transfer service in their respective districts. Violation or neglect of the rules is the cause of most of the office messages now sent, and an occasional examination of the office messages on file would reveal any irregularity, and enable transfer agents to take the proper steps to prevent a repetition of the offence. A strict compliance with regulations should be enforced, and any difficulties experienced reported to this office.

GEO. H. MUMFORD,
Vice-President.

EXECUTIVE OFFICE,
NEW YORK, April 30, 1873.

In the list of new transfer offices in D. H. Bates' District, given in the last JOURNAL, for Morristown, Pa., read Morristown, N. J.

G. H. MUMFORD,
Vice-Prest.

THE SECRETARY OF THE TREASURY IN REGARD TO DUTIES ON OCEAN CABLES.

Mr. Orton, President of the Western Union Telegraph Company, having requested certain privileges in the matter of the new cable on the Kangaroo, Secretary Richardson has written Collector Arthur as follows:

"In regard to the shore end of the cable, the Department would state that heretofore it has been the practice to allow the free entry of submarine cables intended to bring the United States into communication with foreign countries, and therefore, so far as that is concerned, Mr. Orton's request is hereby granted, and you will be governed accordingly. The previous action of the Department in like cases has not, however, included the exemption from duty of the apparatus necessary to work the cable, and the Department is not disposed to set a precedent in this respect. That portion of the application is therefore denied. The remittal of the tonnage tax will be made the subject of another communication."

OWING to press of matter received at a late moment, the acknowledgment of assessments of the Telegrapher's Insurance Association is unavoidably crowded out. It will appear in our next.

BORN.

ALEXANDER.—At Ludington, Mich., April 3, 1873, a daughter to H. F. Alexander, Manager W. U. Tel. Office.

DODD.—At Girard, Kansas, April 6, 1873, a son to George A. Dodd, Manager W. U. Tel. Office.

HUNT.—At Terre Haute, Ind., April 15, 1873, a son to Harry C Hunt, Operator I. and St. L. R. R., Carbon, Ind.

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FOREIGN TELEGRAPHIC ITEMS

BASIS OF PROPOSED CONSOLIDATION OF THE ATLANTIC CABLE COMPANIES.—The following is the basis proposed for the consolidation of the Anglo-American, French Atlantic, and New York, Newfoundland and London Telegraph Companies:

The capital to be £8,000,000, divided into 800,000 shares, of £10 each, of which 400,000 are to be preference shares, with a dividend of six per cent. per annum, and 400,000 ordinary shares.

The terms upon which it is proposed to exchange the new stock for the existing shares is as follows: For every £100 of Anglo-American stock, £200 of the new, of which ten shares shall be preferred and ten shares ordinary.

For every £20 French Atlantic stock, £40 new—equally divided into preferred and ordinary stock. For every £20 of New York, Newfoundland and London stock, £30 of the new stock, preferred and ordinary in equal amounts.

TERMS OF THE AMALGAMATION OF THE ATLANTIC CABLE COMPANIES.—The respective boards of the Atlantic Telegraph companies have at length agreed upon terms of amalgamation, and the proposal will be submitted at an early date for the sanction of the shareholders. The capital of the amalgamated undertakings will amount to £7,000,000, distributed as follows: To the French Atlantic Telegraph Company £3,450,000, to the Anglo-American Company £2,550,000, and to the New York, Newfoundland and London Company £1,000,000. It will be noticed that the capital is £1,000,000 less than that of the proposed Consolidated Atlantic Telegraphs Company limited. The Newfoundland Company, however, are agitating for better terms.

A dispatch from London, dated the 29th, states that consolidation between these Companies was effected on the 28th.

THE TELEGRAPH IN BRAZIL.—Mr. Charles Burt, the representative of the English Great Western Telegraph Company, is now in Rio Janeiro. This Company owns the Brazilian coast cables concessions, and is intending to lay a cable from Para to Rio Grande do Sul, in the course of the next twelve months, and in connection with the company going to lay the Lisbon and Pernambuco cable. Mr. Burt is effecting some preliminaries with the government, and it is probable that the imperial government will place a war steamer at his disposal for the soundings that have to be made. A slight difficulty exists about a conflict of concession with the Lamas, one for a cable between Rio and the River Plate; but it seems probable that some compromise or amalgamation will be effected.

A CONCESSION has been granted by the Spanish Government, giving certain parties the right to lay lines of telegraph cable from Cuba or Porto Rico to Hayti, in St. Domingo.

AN interim dividend of two per cent. for the quarter ending March 31st, payable May 1, has been declared by the directors of the French Cable Company.

AT a meeting of the directors of the New York, Newfoundland and London Telegraph Company, it was resolved to declare an interim dividend of 10s. per share for the quarter ending March 31st.

THE Emperor of Russia has recently granted to a joint stock company a concession to lay and work a submarine telegraph cable between Odessa and Constantinople.

THE number of messages forwarded from postal telegraph stations in the United Kingdom during the week ended March 19, 1873, was 350,551—an increase on the corresponding week last year of 89,862.

THE TELEGRAPH IN PERU.

Correspondence of the Panama Star and Herald.

LIMA, March 28, 1873.

In one great feature of the general project for internal progress and material advancement, Peru has been singularly unfortunate. Whilst her railways have been approaching a successful completion, her agricultural interests extending in importance every day, her commerce increasing in a wonderful manner for a South American republic, her telegraphic system has failed to achieve its end or perform its duty, and there are probably few civilized countries where so little faith may be placed in the electric medium of conversation. The reason of this misfortune is, at the same time, clear to the unprejudiced observer. The telegraphic lines in Peru extend over barren deserts only traversed by the muleteers and Indians of the coast districts; the distance between the stations are excessive; the necessity for this usually required means of communication is limited, and the enhanced cost of material, the exorbitant salaries paid to the employees, and the continual disasters arising from floods, do not compensate those who have ventured to embark their capital in the enterprise. At first the lines were constructed in the cheapest manner consistent with the expected requirements; afterwards it was found necessary to substitute iron for wooden posts, a considerable expense in itself, and finally the Company recognized the expediency of placing guards along the lines of wire. But even these precautions have proved insufficient against the continued warfare of man and the elements; many, since the uneducated people through whose territory the wires in many instances pass, regarded the innovation as directly against their privileges and interests, and feared that their ancient and profitable employment and couriers would entirely disappear before the strange method employed for conveying intelligence. Hence many cases have occurred when the denizens of these more than rural districts have arisen in their wrath, destroyed the posts, torn down the wires, and intimidated the operators to such a degree that communication has been suspended, for considerable lengths of time, between the most important points of the Republic. The telegraph in Peru is in the hands of a company composed of some of the most energetic men of the country. Their enterprise, vigilance and ability have proved to be unequal to the mode of warfare employed by their enemies. Hardly a day passes but the chief office in Lima receives the unwelcome intelligence of the destruction of a portion of the works by human or superhuman means. In fact things have arrived at such a pass that the Government has seen proper to interfere, and the Minister of Public Works, acting under the instigation of President Pardo, has presented a proposition to Congress to the following effect: "The nation shall become the proprietors of all the telegraph lines in the Republic, after having paid to the company now holding the same a fair and just valuation for the stock on hand, and the undertaking as it stands, covering this value with bonds pledged for the extinction of the internal debt, bearing an interest of 6 per cent. per annum; an authorization to be granted to the Government to continue the line from Pisco to Iquique, thereby perfecting the electric communication from the last named port to Payta, a distance overland of more than one thousand miles; and furthermore soliciting the permission of Congress the guarantee and interest of 5 per cent. on the sum of 1,500,000 soles, which is estimated for the successful submersion of a cable from Payta to Panama." The advantages of the scheme are so obvious, and the profitable results to be deprived from its accomplishment by commercial circles are so readily comprehended, that Congress very favorably received the indication of the Executive, and we have reason to believe that the resolution of the legislative body will harmonize with the desires of the President and his immediate counsellors.

At present Peru boasts of nearly 1,000 miles of telegraph in actual use, but which, under the administrative measures now in force, do but little more than cover working expenses. The Government, basing its ideas on the happy results obtained by our neighbor Chili, and the striking example of Great Britain, will bravely undertake the experiment, provided it may be possible to secure the consent of Congress, which, as I have already stated, appears to be more than probable.

DETAIL OF THE ESTIMATE FOR THE BRITISH TELEGRAPH SERVICE.

The increasing work of the Telegraph Department causes an increasing amount of working expenditure. The estimate for the financial year 1873–74 is 815,000*l.* When the Civil Service Estimates were presented to Parliament on the 27th of February, this particular estimate had not been submitted to the Treasury; it arrived there, however, on the next day, and is printed in the volume of Civil Service Estimates; but, unfortunately, it was impossible to subject it to previous examination by the Treasury. The department being so new, some account of the expenditure will be acceptable. A sum of 46,646*l.* is required for the Secretary's office and account departments, in which there are upwards of 400 officers employed; the amount includes 300*l.* a year for the Second Secretary to the Post-Office, Mr. Scudamore, who has a salary of 1,500*l.* a year from that department. The sum of 175,412*l.* is required for "the maintenance of the telegraph system;" under this term are included the salaries of 656 officers in the engineers' offices and the factories, 12,000*l.* for traveling, 24,000*l.* for materials and carriage, and 33,000*l.* for maintenance by railway companies. The total of this item is 42,870*l.* more than was voted for it last session. A sum of 15,000*l.* is required for remuneration of railway companies for the transaction of telegraph business at their stations on behalf of the Postmaster-General. Three great items for salaries and expenses follow—87,908*l.* for the central telegraph station in London, with its 1,530 officers; 60,671*l.* for the district and branch post-offices in London; and 373,412*l.* for provincial post-offices; the increase on the three items amounting to 95,129*l.* There is also required 6,325*l.* for the special staff of 18 officers for special occasions, when the ordinary force of the department is unequal to the sudden pressure of work; the item includes traveling expenses and rent of offices at race-courses. For telegraphic instruction there is to be a vote of 1,726*l.*; for superanuations and gratuities, 400*l.*; for repairs of buildings and furniture, 15,000*l.* One more item of 32,500*l.* includes three sums—13,000*l.* for uniform dress, or, at all events, pouch and bag, for the 6,458 messengers and linemen; 16,500*l.* for stationery, inks and small stores at stations, and 3,000*l.* for poundage on sale of postage stamps used for telegrams. The department gives employment to a large number of female clerks. At the central telegraph station in London there are about 700. They do no night duty nor Sunday duty. Four of them receive salaries commencing at 160*l.* a year, and rising gradually to 200*l.* a year, and six others from 120*l.* to 150*l.*, and there is a matron with a salary commencing at 150*l.* and rising to 250*l.* a year. There is a medical officer for that station with a salary of 800*l.*, calculated at 10s. for each person, including medicine.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, MAY 1, 1873.

INCREASE IN ATLANTIC CABLE RATES.

In consequence of the interruption of two of the Atlantic cables the decrease in rates, which was announced as to go into effect May 1st, will not take place. On and after that date, from New York City, the New England States, and the British Provinces, to Great Britain and Ireland, the rate per word will be one dollar and fifty cents. The tariff to France will be estimated upon a minimum of ten words, fifteen dollars, and one dollar and fifty cents for each word over ten. To this must be added the continental rate from London to France, one dollar and twenty-five cents for twenty words, and half of that rate for every ten or fraction of ten in addition.

The rates from all other offices in the United States are proportionately increased by this advance.

TELEGRAPH ESTABLISHED BETWEEN SAVANNAH AND TYBEE ISLAND, GA.

A line of telegraph has recently been completed by the Tybee Telegraph Company, between the City of Savannah (Ga.) and Tybee Island, at the mouth of the Savannah River, which is designed for the convenience of the shipping interests of that port. This connection meets a want long experienced, communication having heretofore been maintained by the uncertain and slow methods in use by the original settlers. The Company has constructed a comfortable house on the northeastern shore of the island, immediately in front of the Lighthouse and opposite to the bar of the river, and is supplied with thermometrical and signal apparatus, telescopes, &c., for reporting weather, and signalizing and sighting vessels. The office is distinguished by the American and the Company's flags flying from large flag-staffs immediately in front of the office.

The line connects with the Western Union at Savannah.

Gen. T. T. Eckert, of the Western Union Commission to Europe, arrived yesterday on the *Scotia*, from Liverpool. He is in excellent health.

THE POSTAL TELEGRAPH SCANDAL.

The British public continue to be considerably exercised over the revelations of the Committee appointed by the House of Commons to investigate the proceedings of the Post Office Department. Apparently losing sight of the false step, the taking of which was the direct cause of the systematic deceptions now brought to light, the English papers, with a singular unanimity, confine their comments upon the report of the Committee and the testimony of Mr. Scudamore, to condemnation of the course of the Post Office authorities in appropriating certain funds, held in trust, to an illegitimate, yet, they are careful to state, not dishonest use. As the London *Times* remarks :

"It is easy to understand how such transactions arose, and to see that they were prompted by creditable but mistaken motives."

The *Economist* says :

"Mr. Scudamore had to make and work the telegraphs—and what was he to do."

The line is drawn exceedingly fine. Mr. Scudamore had not to make the telegraphs. They existed, efficient to a degree not since exceeded, when Mr. Scudamore with his mistaken conclusions induced the Government to acquire their control. The present scandal is the result of a false idea of political economy to which the British Government became committed by the bad counsels which it accepted.

With the financial morality of these transactions we have no concern, but in view of the persistent endeavors made heretofore, and threatened for the future, by politicians, lobbyists, and official speculators in the United States, in their greed for power and wealth, to fasten upon us a similar burden, the exposure is timely, and withal so complete that a blunder in this direction will now be a crime.

In the United States to-day there exists about 85,000 miles of lines. When it is considered that 23,000 miles of lines in Great Britain has cost the Government of that country $56,000,000, where there was the greatest inducement for rigid economy in expenditure, an idea can be arrived at concerning the actual amount which our Government would have to expend, if, at a fair valuation, it acquired possession of the American system.

We are hopeful that with the bursting of this bubble, the last has been heard, for a generation at least, of our Government entering into business which legitimately belongs to and is best promoted by private corporations. If, however, at any time it should be necessary to the welfare of the country that the Government should possess the telegraph lines, let it be done understandingly. Elaborate disquisitions, lacking in degree the essential element of truth, and bolstered up by false estimates, can no longer be palmed off as facts upon a Congress ignorant of the true condition and nature of the subject.

TELEGRAPHIC COMMUNICATION WITH CUBA RESTORED.—The cable from Key West, Fla., to Havana, Cuba, has been repaired, and business is now sent direct.

THE NEW CABLE TO BE LAID TO HEARTS CONTENT INSTEAD OF HALIFAX.

We learn, on good authority, that the announcement of the amalgamation of the Anglo-American French Cable and the New York, Newfoundland and London Telegraph Companies is a fixed fact. The first result of this arrangement will be the laying of a third cable between Valentia and Hearts Content, and it is probable that a portion of the cable now being put into the Great Eastern will be used for that purpose instead of, as intended originally, being laid to Halifax. The Consolidated Companies contemplate the furnishing this summer of additional wires over the other sections of the route.

It is stated that in view of this decision the *Kangaroo*, which recently laid at Halifax and New York the shore ends of the new cable, will pick them up and return home.

TREASURER'S OFFICE,
WESTERN UNION TELEGRAPH COMPANY.
NEW YORK, April 30, 1873.

To all Managers of Offices :

Your attention is particularly requested to the following circular. This act of Congress makes it necessary to exercise great caution in accepting any gold coin which shows the least sign of abrasion.

R. H. ROCHESTER,
Treasurer.

STANDARD WEIGHT, LEGAL LIMIT OF ABRASION, AND LEAST CURRENT WEIGHT OF UNITED STATES GOLD COIN.

TREASURY DEPARTMENT,
OFFICE OF THE DIRECTOR OF THE MINT,
WASHINGTON, D. C., April 1, 1873.

Section 14 of the Coinage Act of 1873 provides that gold coins which have become reduced in weight by natural abrasion not more than one-half of one per centum below the standard weight, after a period of circulation of twenty years, and a proportionate rate for a less period, shall be received at their nominal value at the United States Treasury and its offices.

The following tables exhibit the standard weight, legal limit of abrasion, and least current weight of single pieces, and sums of $100, $500, $1,000 and $5,000 United States gold coin (excluding the dollar), under the act referred to :

Statements exhibiting the Standard Weight, Legal Limit of Abrasion, and Least Current Weight of United States Gold Coin after a circulation of twenty years, under the provisions of the Coinage Act of 1873.

WEIGHT OF SINGLE PIECES.

Denomination.	Standard weight, in grains.	½ per cent. abrasion, in grains.	Least current weight in grains.
Double Eagle	516	$2\frac{58}{100}$	$513\frac{42}{100}$
Eagle	258	$1\frac{29}{100}$	$256\frac{71}{100}$
Half Eagle	129	$0\frac{64}{100}$	$128\frac{36}{100}$
Three-Dollar	77.4	$0\frac{38}{100}$	$77\frac{02}{100}$
Quarter Eagle	64.5	$0\frac{32}{100}$	$64\frac{18}{100}$
Dollar	25.8	$0\frac{13}{100}$	$25\frac{67}{100}$

The legal deviation from the standard weight on the gold dollar being one-quarter of a grain, it will continue current until reduced in weight below $25\frac{55}{100}$ grains.

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THE TELEGRAPH IN EUROPE.—LETTER FROM MR. GEORGE B. PRESCOTT.

BERLIN, April 10, 1873.

MY DEAR SIR: By far the most systematic and best appointed telegraph that we have seen yet is the Prussian, or the German, for all the lines in the empire are now worked as one system. Here everything pertaining to the telegraph is as systematically arranged as in a well appointed army. The Director-General, Col. Meydam, is a splendid-looking officer, of dignified and commanding presence, and I should think, about forty years old. He received us with the utmost cordiality, and personally showed us for two days over the Central establishment. To-day we are to see the auxiliary offices, and dine with him and some other guests at his house. The Prussian system embraces about 60,000 miles of wire, and is managed under Col. Meydam, the Director-General, by twelve Directors situated at convenient points. Everything in each district is completely under the control of the Director of the District, and the Director-General issues his orders only to the Directors. Messages are paid by stamps, and no record or copy is made of them. Number lists are printed very much like ours, and every morning each office commences numbering by checking each number on the list as messages are received from the customers. These number sheets, and the original messages duly stamped and defaced by making a diagonal line across the face of the stamp with a pen and black ink, are sent each day to the auditor, who sees that the numbers correspond, and who causes another line in red ink to be made across the face of the stamp. This constitutes the whole auditing machinery. The affixing and defacing of the stamp shows that the department has been paid for sending the message. All the messages in each department are retained in the various offices, and the Directors from time to time visit the offices, or send clerks to visit them and see that the messages correspond with the number sheets, and that they are all duly stamped. Messages going to other lines upon which amounts have to be paid, are recorded in a book in substantially the same manner as ours, but the great bulk of the business is done by stamps. The cost of the stamps is seventy cents for 5,000. The battery used is similar to Phelps' make of the gravity or Callaud battery. The cost of the battery for the Prussian lines is $15,000 per year. They work about five wires out of each battery. In charging the battery only one ounce of blue vitriol is used. The relays have a resistance of 700 ohms, or five times as much as ours. This admits of their being worked with a very much smaller battery power, and consequently at very much less cost. The railroads have their own wires—three wires for each road—and they are worked independently of the government system. Where there are small offices, a constant or closed circuit system is employed like ours, but between all the larger offices they employ the open circuit system, which again makes a great saving in the battery. The insulation in Prussia is the white porcelain on a curved iron shank, which is screwed into the pole. In France white porcelain is employed also, but of a different pattern, the porcelain being fastened to the pole by screws. And in Belgium the white porcelain is fastened to the pole by an iron band near the top of the insulator. The underground lines in Prussia are laid down in a much less expensive manner than England. Seven gutta-percha wires are made into a cable and covered with iron wires. A trench is dug about four feet deep—below frost—and the cables are placed in it and pocketed with brick to prevent injury by the tools of workmen who might chance to dig down for laying gas-pipes or other purposes. In England the wires are enclosed in iron tubes or pipes. In Paris the subterranean wires are made into cables, covered simply with canvas and carried through the sewers. Col. Meydam says the underground wires give them very little trouble. Some of them have been laid down for over fifteen years. We saw the great Indo-European line in operation yesterday from London to Teheran, a distance of 4,000 miles. There were four repeaters in circuit, and the speed was 8½ words per minute. They said they could work faster, but there was not business enough to require it. We saw Siemens' automatic system in operation for sending weather reports. They do not employ the automatic system for sending ordinary messages. The Hughes instrument is employed upon all the great lines, and it performs the bulk of the service in continental Europe. It works rather more than half as fast as the Phelps, and is a valuable instrument. Col. Meydam has received the Stearns Duplex, but has not set it up. I shall offer to do it for him to-day in return for his attention to us. I shall probably leave here for Vienna on Monday. We spent one day at Siemens' factory and got many valuable ideas. We are all well, and are enjoying the trip very much, but are anxious to return as soon as possible. Were not sick in crossing the Channel.

GEO. B. PRESCOTT.

Hon. WILLIAM ORTON, *President.*

THE FRENCH ATLANTIC CABLE BROKEN.—The French Atlantic telegraph cable is broken, and there is now but one cable working to Europe. The electricians of the Company locate the break at a distance of two hundred and thirty miles from Brest.

Mr. H. HIGHTON, in a letter to the London *News* relating to the recent break in the Atlantic cable of 1865, makes the assertion that the wit of man could not have devised a better way than that in which the sheath of the Atlantic cable was constructed to secure its speedy destruction by rot. The sheath was formed of hempen cords, each with an iron wire in the middle. If a tablecloth is hung out on an iron wire to dry, as everybody knows, there will soon be a hole wherever the cloth has touched the wire. Mr. Highton reasons that in some parts of the Atlantic, at least, the iron wire in the cable sheath is likely to rust; the rust destroys the hemp; and then, the iron and hemp both gone, the core of copper and gutta percha will break from the slightest cause. This view of the subject has brought out several letters in which the position of Mr. Highton is strongly assailed; but he has retorted with the recital of two facts which are worth any number of unsupported theories. One of these facts is that a gentleman has brought him a piece of cable constructed on the plan he considers so faulty, which was picked up accidentally while dredging in eleven hundred fathoms of water in the Mediterranean. It had been down for ten years, and was quite rotten. The iron wires were rusted through, they had destroyed the hemp about them, and their fragments were sticking out like rusty needles. The other fact cited is that some years ago the West India Dock Company, in order to strengthen the hempen cables they used about their docks, tried the use of iron wires inside. The result was the iron wire and hemp destroyed each other in a few months. The importance of this subject, when the enormous cost of a telegraph cable stretching from one continent to another is considered, must be apparent to every one. Mr. Highton has a plan by which he thinks seven cables of an improved construction can be laid at the cost of one of the present ones, but he does not explain what that plan is.

THE SHORE ENDS OF THE NEW FRENCH ATLANTIC CABLE LAID.

The steamer Kangaroo, which has been laying the shore ends of the new Atlantic cable, left her moorings off Rockaway Beach on Saturday morning, and steamed to New York. The vessel has laid two shore ends of cable at Halifax, one pointing towards New York and one to be united with the main cable from England. The shore end of the main cable was laid from the cable-house at Freshwater, Halifax, to point about twenty miles distant, off Chebucto Head. It was there buoyed up to await the arrival of the Great Eastern, which is to lay the cable from Land's End, Cornwall, England, to Halifax. The other section of the cable will run, if there be no change of programme, from Halifax to a point on the south side of Long Island, opposite Hog Island, and about five miles from Far Rockaway. The end at Halifax which is to connect with Long Island was laid by the Kangaroo from Point Pleasant outward for ten miles, and there buoyed. After the connection of the other Halifax end with the main line, that section will be joined to the Long Island end. On Thursday afternoon the Kangaroo arrived off Hog Island, and, wind and tide being favorable, it was determined to proceed at once to land the cable. The cable was cut, placed upon an improvised barge, and gradually paid out as the barge was towed ashore. A coil of about 500 yards remaining, it was deposited on the beach and secured by piles, as it will be stretched along the beach and finally connected with a cable at Pearsall's Corners, which proceeds to Brooklyn.

THE ADVANCE IN CABLE RATES EXPLAINED.

President Orton, of the Western Union Telegraph Company, deprecates the statement made in several of the newspapers, that the recent advance in rates for ocean telegraphing was for the purpose of increasing the revenue of the companies. Recently there were three cables, now there is only one, in working order. The unimpaired cable has been taxed to its utmost capacity with business formerly divided among the three lines, and although every effort is made, the present line is falling behind, and dispatches sent over it will soon be practically valueless. It was with the view of compelling customers to withold their business, as far as possible, until additional facilities were afforded, that the rates were advanced. President Orton says that one of the impaired cables will probably be regained, and placed in working order as soon as the weather is favorable. There may be some doubt as to the other cable, which has probably suffered from corrosion.—*New York Tribune, 28th.*

THE NEW CABLE SHIP.—The largest vessel ever built on the Tyne was launched from Mitchell's yard, Newcastle, on March 29. She is intended for the laying of transatlantic cables for the Western Telegraph. She is 5,000 tons register, and has a carrying capacity larger than that of any vessel afloat except the Great Eastern. The whole available length of the ship is divided into three tanks for the storing of cables. Only four months and a half were occupied in her construction. At a banquet held in the evening, at which Mr. Hooper, the Chairman of the Telegraph Company, and Sir W. Thompson were present, it was stated by the latter that the object of the Company was to convey transatlantic messages at the same rates as those for which letters are carried. They hoped, indeed, to fix a tariff at as low a rate as a penny.

Mr. D. Van Nostrand advertises, on page 171, the new English periodical, The Telegraphic Journal and Electrical Review.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY.

FEBRUARY, 1873.

APPOINTMENTS.

W. H. Harris.....Jamaica, L. I.
Wm. Bangs.....145 Broadway.
L. O. Brarken.....“
P. C. Calhoun.....134 Pearl.
Miss C. A. Deisher.....115 Broadway.
Miss Annie F. Elliott.....“
W. S. Lewis.....“
Miss Frankie A. Pike.....“
Lewis Weber.....“
T. F. Keller.....21 Wall.
C. Van Benschoten.....“
W. McGill.....Pier 30.
W. W. Smith.....134 Pearl.
O. Johnson.....Enniskillen, N. B.
C. F. Byrne.....Frederickton, N. B.
J. E. Price.....Peticodiac, N. B.
C. F. Cameron.....Plaister Cove, C. B.
C. J. Hoyt.....Sackville, N. B.
M. L. Campbell.....“ “
M. C. Webster.....Stellarton, N. S.
Miss P. J. C. French.....Lincolnville, Me.
O. K. Currier.....So. Lawrence, Mass.
E. W. Hurlburt.....Lancaster, Mass.
J. S. Welch.....Windsor, Vt.
F. K. Ainsworth.....Woodstock, Vt.
J. P. Hopson.....Branford, Ct.
Miss Alice Sweet.....E. Killingly, Ct.
Miss M. M. Vanderberg.....Hartford, Ct.
Miss L. M. Roberts.....Mitteneaque, Mass.
Miss M. M. Lowell.....Palmer, Mass.
Miss C. Richardson.....Boston, “
Miss C. E. Barnes.....“ “
Miss Cora Gallup.....Oneco, Ct.
Miss M. M. Tinell.....Harrison Sqr., Mass.
E. J. Kimball.....Tivoli, N. Y.
C. J. Wait.....Manchester, Vt.
Purdy T. Connell.....Golden Br., N. Y.
Byron Clark.....Johnsonville, N. Y.
Frank Pierson.....Jordan, N. Y.
C. E. Hutchinson.....Phœnix, N. Y.
Geo. Somers.....Port Leyden, N. Y.
Wm Dopffel, Jr.....Susp. Bridge, N. Y.
C. P. Burghardt.....Whitney's Pt., N. Y.
Albert Ivens.....Beverly, N. J.
C. M. C. Fulton.....Baltimore, Md.
C. H. Hicks.....“ “
Hy. Spohr.....Harrisburg, Pa.
Jno. Saylor.....Hoboken, N. J.
N. W. Beidler.....Philadelphia.
W. H. Pusey.....“
Miss Arbuthnot.....Newark, N. J.
Geo. V. Graves.....Pittston, Pa.
O. M. Hamerick.....Wilkesbarre, Pa.
E. Barnard.....Washington, D. C.
Wm. Haight.....“ “
C. J. Kirshman.....Ashland, Md.
Albert Ivans.....Douglasville, Pa.
Jno. J. Sellers.....Fleetwood, Pa.
E. F. Scholl.....Kutztown, Pa.
Jas. H. Wellon.....Towsontown, Pa.
Orin Jencks, Jr.....Parkersburg, Md.
J. Cook.....“ “
W. Mellinix.....Oakland, Md.
G. W. C. Day.....Sir John's Run, Md.
W. P. Ward.....Champaign, Ill.
E. G. Foote.....Chicago, Ill.
J. H. Long.....“ “
T. R. Knox.....“ “
Jas. O'Connor.....“ “
W. P. Johnson.....“ “
W. I. Loque.....“ “
E. Hoffman.....“ “
J. M. Watson.....Cairo, Ill.
J. S. Thompson.....Milwaukee, Wis.
W. F. Purdy.....Lansing, Ia.
M. M. Herrington.....Atchison, Neb.
C. M. Clark.....Fort Scott, Ks.
D. Hunter.....Hamburg, Ia.
J. H. French.....Denver, Col.
J. W. Davnor.....Ft. Saunders, Col.
G. W. Stebbins.....Las Vegas.
J. A. McKenna.....Omaha, Neb.
L. M. Painter.....Salt Lake, U.
S. Hill.....Oil City, Pa.
C. F. Sloan.....Pittsburgh, Pa.
T. H. Howard.....Titusville, Pa.
G. W. Moltz.....Fullerton, Pa.
Miss C. A. Hammond.....Buffalo, N. Y.
M. Louisa Brown.....“ “
L. Vemetto House.....“ “
C. H. Billings.....Cleveland, O.
F. W. Corn.....Dunkirk, N. Y.
W. O. Keefe.....Forestville, M.
C. Howell.....Fostoria, O.
W. J. Perriu.....Jackson, M.
H. J. Olney.....Lakeport, M.
F. Horton.....Pontiac, M.
J. U. Rust.....Sandusky, O.
E. M. Bronson.....Toledo, O.
J. S. Cooper.....Owasso, M.
P. H. Carey.....Romeo, M.
J. J Diffley.....Indianapolis, Ind.
J. H. Rhodes.....Lafayette, Ind.
S. B. Roberts.....Cincinnati, O.
Vercoe.....Columbus, O.
W. F. O'Gara.....“ “
L. W. Madison.....“ “
Miss Dora Conklin.....Hanging Rock, O.
John Nutt, Jr.....Abbotsburg, N. C.
W. W. Slocumb.....Charlotte, N. C.
J. D. Potts.....Durham, N. C.
J. C. Goodwin.....Frederick Hall, Va.
A. B. Bentley.....Jarratts, Va.
J. G. Cooley.....Thomasville, N. C.
Geo. D. Rollins.....Wilmington, N. C.
S. Roberts.....Grand Junction, Tenn.
Shefers.....Memphis, Tenn.
G. L. Davis.....Savannah, Ga.
B. L. Smith.....Covington, Ga
W. Mender.....Artesia, Miss.
C. J. Dupree.....B. Meadow, Ala.
L. P. Worl.....Evansville, Ala.
J. R. Honnady.....Fort Deposit, Ala.
Ward Parker.....Gainesville, Ala.
W. C. Wyche.....Loochapoka, Ala.
G. W. Walker.....Montgomery, Ala.
R. Pearsons.....Rienzi, Miss.
W. D. Manor.....Saltillo, Miss.
T. L. Rose.....State Line, Miss.
M. N. McLaine.....Whistter, Ala.
G. W. L. Smith.....Waynesboro, Miss.
J. H. Payne.....Garner, Miss.
R. L. Burnett.....Madison, Miss.
J. H. Wile.....62 Mile Siding, Miss.
W. W. Irwin.....Tangepahoa, La.
S. B. Lee.....Taylors, Miss.
M. Elser.....Marshall, Tex.
P. R. Rodgers.....Brinkley, Ark.
D. M. Hall.....Monroe, La.
Wm. Burlasher.....Galveston, Tex.
H. McDaniel.....Kilgore, Tex.
F. R. Wilson.....Aurora, Or.
Emery Allen.....Corvallis, Or.
S. N. Calhoun.....Cisco, Cal.

RESIGNATIONS.

J. W. Burnham.....5th Avenue Hotel, N. Y.
J. J. Brower.....Canal St., N. Y.
E. S. Carr.....Jamaica, L. I.
H. E. Connell.....30th St., N. Y.
G. V. B. Frost.....145 Broadway, N. Y.
Miss Emily H. Harris.....“ “
Miss Maud Harris.....“ “
Miss R. Morton.....“ “
F. G. Owen.....“ “
W. H. Pusey.....“ “
Miss Clara M. Utley.....“ “
D. S. Lyon.....G. Cent. Dep., N. Y.
J. E. Sickles.....145 Broadway, N. Y.
W. Pfeiffer.....Com. Exchange, N. Y.
J. R. C. Wilson.....Enniskillen, N. B.
J. H. Archibald.....Sackville, N. B.
Ella French.....Lincolnville, Me.
W. P. Holder.....Lancaster, Ms.
Thomas Keefe.....Windsor, Vt.
Sturdevant.....Woodstock, Vt.
E. R. Kelsey.....Brandford, Ct.
Miss L. A. Perry.....E. Killingly, Ct.
O. J. Seaver.....Hartford, Ct.
M. O. Morgan.....Mitteneaque, Ms.
Miss Kate Howe.....Palmer, Ms.
L. C. Orvis.....Manchester, Vt.
Miss Alice C. Emerick.....Jordan, N. Y.
W. C. Crombie.....Phœnix, N. Y.
H. D. H. Snyder, Jr.....Port Leyden, N. Y.
Miss Kate Henny.....Susp. Br., N. Y.
M. B. Eldridge.....Whitney's Pt., N. Y.
H. N. Silver.....Beverly, N. J.
Jno. A. Hutchinson.....Baltimore, Md.
Jas. H. Mellon.....“ “
Jno. Westbrook.....Harrisburg, Pa.
Miss Crater.....Hoboken, N. J.
Miss Cornwall.....Newark, N. J.
O. M. Hamrick.....Pittston, Pa.
J. E. Burt.....Parkersb'g, W. Va.
A. E. Remsbury.....Oakland, Md.
J. H. Tossett.....Sir Jno. Run, W. Va.
D. S. Bailey.....Champaign, Ill.
F. E. Chase.....Chillicothe, Ill.
F. L. A. Valiquet (dead).....Chicago, Ill.
E. R Howe.....“ “
H E. Dyer.....“ “
J. W. Union.....“ “
F. D. Foss.....“ “
Jas. O. Connor.....“ “
E. E. Halbert.....Des Moines, Ia.
A W. Robertson.....Milwaukee, Wis.
H. M. Cline.....Pekin, Ill.
E. P. Delano.....Peoria, Ill.
W. F. Emsthauser.....Ft. Scott, Ks.
A. G. Haight.....“ “
J. A. McKenna.....St. Louis, Mo.
Jno. Geckie.....“ “
F. W. Farley.....St. Joseph, Mo.
L. Kelly.....Hamburg, Ia.
A K. V. Hall.....Denver, Col.
F. W. Kingsbury.....Ft. Sanders, Col.
F. Solentz.....Foxburg, Pa.
P. H. Cullis.....Pittsburg, Pa.
D. W. Davis.....“ “
J. A. Duncan.....Sandy Creek, Pa.
F. McKee.....Titusville, Pa.
T. W. Niles.....Dunkirk, N. Y.
Isaac Green.....Forestville, M.
R. Alcott.....Fostoria, O.
W. J. Dell.....Lakeport, M.
A. Armstrong.....Pontiac, M.
R. A. Gager.....Sandusky, O.
T. Betts.....Owasso, M.
H. S. Converse.....Cincinnati, O.
H. W. Nichols.....“ “
S. B. Roberts.....“ “
R. D. Williams.....“ “
J. C. Flood.....Columbus, O.
Miss Phœbe Walker.....Hanging Rock, O.
Thos. C. Closs.....Abbottsburg, N. C.
S. M. Franklin.....Central Va.
E. L. Ligon.....“ “
G. H. King.....Charlotte, N. C.
C. A. Glascock.....Concord, N. C.
T. O. Troy.....Durham, N. C.
N. C. Harris.....Frederick's Hall, Va.
R. B. Janetts.....Jarratts, Va.
R. L. Millan.....Wilmington, N. C.
H. N. Perkins.....Grand Junction, Tenn.
Jas. Quinn.....Louisville, Ky.
C. A. Parson.....Memphis, Tenn.
T. B. Sarboro.....Savannah, Ga.
J. A. Lockard.....Artesia, Miss.
J. O. Simms.....Beaver Meadow, Miss.
M. H. Morris.....Birmingham, Fla.
J. W. Rawlings.....Fort Deposit, Fla.
C. W. McMahon.....Gainesville, Fla.
P. Cooke.....Montgomery, Ala.
W. E. Cooper.....Quitman, Miss.
J. A. West.....Rienzi, Miss.
N. S. Corr.....Sattillo, Miss.
J. C. Smithson.....State Line, Miss.
E. B. Drane.....Trombasuba, Miss.
W. Redus.....Whistler, Ala.
J. R. Huggins.....Waynesboro, Miss.
M. T. Kendall.....Oakland, Miss.
Thos. Fox.....Madison, Miss.
R. H. Pegues.....62 Mile Siding, Miss.
T. P. McLemore.....Tangepahoa, La.
J. M. Calvin (Died).....Marshall, Tex.
A. B. Lucas.....Brinkley, Ark.
A. Russell.....Galveston, Tex.
W. H. Wilson.....Kilgore, Tex.

TRANSFERS.

Name.	*From.*	*To.*
J. N. Applebaugh	145 Broadway	134 Pearl St.
Thos. Brown	21 Wall	5th Av. Hotel.
A. D. V. Brown	Relief	22 Broad St.
Miss H. Dickman	134 Pearl	Grand St., (E. R.)
Asa Davis	145 Broadway	Chattanooga.
Mary L. Dubois	“ “	Grand St., (E. R.)
J. M. Foster	22 Broad	145 Broadway.
G. Irving	30th Street	“ “
W. G. Magowan	Grand Cent. Hotel	Metropolitan Hotel.

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Ralph Weill.....	St. Nich. Hotel.....	Canal St.
Emery Smith	Tivoli, N. Y.....	..Coxsackie Sta., N.Y.
H. P. Beidler.....	Chester, Pa.....	Philadelphia, Pa.
Fannie Hurst.....	Morristown, N. J....	Mt. Clair, N. J.
Geo. H. Brown.....	Newark, Del.....	Chester, Pa.
E. C. Boileau.....	Philadelphia, Pa.....	Washington, D. C.
J. Christie...	" "	" "
H. F. Atkinson.....	Wilkesbarre, Pa.....	Philadelphia, Pa.
G. E. Millar.....	Atchison, Ks.....	St. Louis, Mo.
E. L. Smith.....	Kansas City, Mo....	St. Joseph, Mo.
J. L. Gilson.....	Golden City, Col....	Beaver Creek, Col.
B. M. Rice.....	Las Vegas, N. M....	Denver, Col.
E. T. Duncan.....	Fullerton, Pa.....	Foxburg, Pa.
E. W. Gibson..	Buffalo, N. Y.....	Cincinnati, O.
F. A. Moore.....	Indianapolis, Ind..	Lafayette, Ind.
C. F. Reals.....	Lafayette, Ind.....	Indianapolis, Ind.
C. W. Trice.....	Thomasville, N. C...	Concord, N. C.
Hy. Hutchins.....	Barnett, Ga.....	Thomson, Ga.
J. H. Crowder.....	Loochapoka, Ala....	Marietta, Ga.
E. B. Hovis.....	Marietta, Ga.....	Bingham, Ala.
S. F. Maban.....	Garner, Miss.....	Oakland, Miss.
B. F. Collins.....	Richmond, Texas...	Harrisburg, Tex.
T. R. Beard.....	Harrisburg, Tex. ..	Richmond, Tex.
T. C. Mann.....	Houston, Tex...	Sherman, Tex.
C. H. Taylor.....	Elko, Nev.....	Diamond, Nev.
J. P. Thurman.....	Aurora, Or.....	Comstock, Or.

LIABILITY OF TELEGRAPH COMPANIES.

IMPORTANT LEGAL DECISION—NO RESPONSIBILITY FOR DISPATCHES NOT INSURED OR REPEATED.

The Supreme Court of Massachusetts has recently sustained the validity of the blanks used by telegraph companies, in an action brought to recover damages for the non-delivery of an unrepeated day-message, written upon the usual blank of the Western Union Telegraph Company. Redpath & Fall, proprietors of the Lecture Bureau, Boston, in response to a message from Rochester asking if they could send a lecturer to supply the place of Robert Collyer, telegraphed that they recommended the Hon. William Parsons, who would lecture for a sum named. Receiving directions by telegram to engage him, they sent a dispatch to him at Owego, N. Y., which dispatch was sent, by a mistake of the operator, to Oswego, N. Y., and was never received by Mr. Parsons, much to his loss as well as to that of the Rochester lecture committee, and to the disappointment of the audience assembled to hear him. The action was brought to recover Mr. Parson's loss of his fee for the lecture, the expenses of the Rochester committee, and the commissions of Redpath & Fall. Chief-Justice Chapman delivered the opinion of the Court, no Judge dissenting; and, after quoting the printed heading on the telegraph blank, held that the message having been neither repeated nor insured, which might have been done at an additional cost, the Company was not liable; and it was immaterial whether the senders read the printed heading or not, so long as they wrote the message under it and signed it, and paid for sending an unrepeated and uninsured dispatch. In the opinion of the Court, the error did not arise from the state of the atmosphere, nor from the imperfection of instruments, nor were the Company guilty of fraud or gross negligence, nor was the error of such a character that the Company could not legally contract for their own protection against liability for it, on such terms as the printed conditions contain. The Judge said, in concluding: "It seems to us that one who elects to save the small sum charged for a more extended liability cannot reasonably claim the benefit of it, in a business where careful operators are so liable to make mistakes." The recognized learning and high character of the Court render this opinion of interest and importance.

THE Executive Mansion of Missouri is said to be so filled with electricity that every one who enters it is terribly shocked. The phenomenon is attributed to the over-charging of the architect who built it.

A PROJECTED GERMAN CABLE.

The *Baltic Gazette* of Stettin, Germany, in a late issue contains the following:

"Since the coming into existence of a direct steam connection between our city and the New World, it is now mooted to have a direct telegraphic connection between here and New York. A German cable is to be laid which shall be under purely German management. The prospects of the project are of the best, and the realization of it is at no distant date.

"A preliminary meeting was held at the Baltic Hotel on the 7th March, which, besides a large number of merchants, ship-owners, &c., was attended by the President of the Admiralty, Von Beüthen; Auditor of the Admiralty, Von Kniffman; Fleet Captain Werding, and Colonel Von Maüthner.

"The Secretary of the Nautical Society, Mr. Ernest Mantel, explained the projected enterprise and demonstrated clearly its financial success.

"The cable has been undertaken by the resident firm of Schlipmann & Schindler. It will be laid from here to a northerly point in the Shetland Islands and thence direct to Port Mergin, Newfoundland, and will be put in direct connection with New York by the land lines. The management in New York is German, so that from here, as also from New York, German messages can be sent direct. There is every probability that this undertaking will be finished by the 1st October of this year."

THE TELEGRAPHIC JOURNAL AND ELECTRICAL REVIEW.

EDITED BY THE

Rev. WILLIAM HIGGS, M.A., LL.D.

Published in London Monthly, and delivered to Subscribers here at $3.00 per annum.

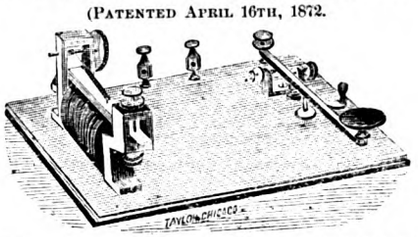
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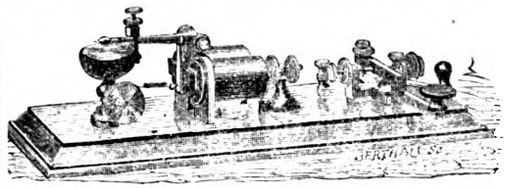
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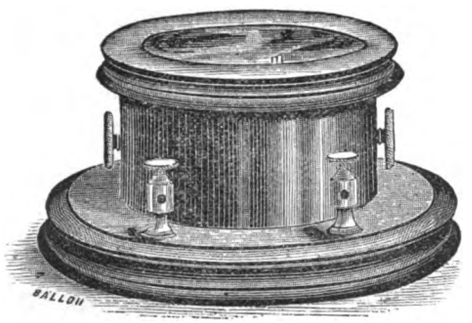
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 12. NEW YORK, MAY 15, 1873. WHOLE NO. 133.

ELECTRICAL DENSITY AND DISTRIBUTION.

By the average electrical density on the whole or any specified portion of the surface of a conductor, is meant the quantity of electricity upon it, divided by its area. By the electrical density at a specified point on the surface of a conductor is meant the average electrical density on an exceedingly small area surrounding it; in other words, the quantity of electricity per unit area at the point. The name is appropriate, from the analogy of ordinary material density, which is mass per unit volume, and is not intended to imply any hypothesis as to the nature of electricity. The name was introduced by Coulomb, who first investigated the subject in question, and is generally employed by the best electricians in this country. The term thickness of electrical stratum, which was introduced by Poisson, is much used in France, but is more open to objection from the coarse assumptions which it seems to involve.

The following are some of Coulomb's results. The dotted line in each of the figures is intended to represent, by its distance from the outline of the conductor, the electric density at each point of the latter. In all cases it is to be understood that the conductor is so far removed from external bodies as not to be influenced by them :

1. Sphere (Fig. 1). The electric density is the same for all points on the surface of a spherical conductor.

2. Ellipsoid (Fig 2). The density is greatest at the ends of the longest, and least at the ends of the shortest axis ; and the densities at these points are simply proportional to the axes themselves. More generally, however, the density at any point on the surface of an ellipsoid is proportional to the length of a perpendicular from the centre of the ellipsoid on a tangent plane at the point. If an ellipsoid, similar and nearly equal to the given one, be placed so that the corresponding axes of the two are coincident, we shall have a thin ellipsoidal shell, whose thickness at any point exactly represents the electric density at that point. Such a shell, if composed of homogeneous matter attracting inversely as the square of the distance, would exercise no force at points in its interior.

3. Flat Disc (Fig. 3). The density is almost inappreciable over the whole of both faces, except close to the edges, where it increases almost per saltum.

4. Cylinder with Hemispherical Ends (Fig. 4). The density is a minimum, and nearly uniform at parts remote from the ends, and attains a maximum at the ends. The ratio of the density at the ends to that at the sides increases as the radius of the cylinder diminishes, the length of the cylinder remaining the same.

In the case of equal spheres in contact, the charge, which is nothing at the point of contact, and very feeble up to 30° from that point, increases very rapidly from 30° to 60°, less rapidly from 60° to 90°, and almost insensibly from 90° to 180°. When the spheres are of unequal size, the charge at any point on the smaller sphere is greater than at the corresponding point on the larger one ; and as the smaller sphere is continually diminished, the other remaining the same, the ratio of the densities at the extremities of the line of centres tends to become 2: 1.

The preceding results were obtained by Coulomb in the following manner. He touched the electrified

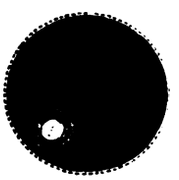


Fig. 1.

body at a known point with the proof-plane, and then put the plane in the place of the fixed ball of the torsion-balance, the movable ball having previously been charged with electricity of the same sign. Repulsion was thus produced, and the amount of torsion necessary to keep the balls at a certain distance asunder was observed. He then repeated the experiment with electricity taken from a different point of

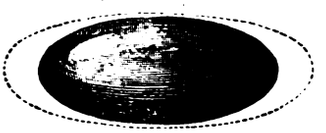


Fig. 2.

the body under examination, and the ratio of the densities at the two points was given by the ratio of the torsions necessary to keep the balls at the same distance.

By way of checking the accuracy of this mode of experimentation, Coulomb electrified an insulated sphere and measured the electric density on its surface by the method described above. He then

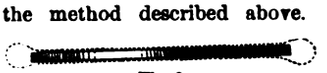


Fig. 3.

touched the sphere with another precisely equal sphere, and on again applying the proof-plane he found that the charge carried off by the plane was just half what it had been before.

The above experiments naturally require some time, during which the body under investigation is gradually losing its charge. The consequence is, that the densities indicated by the balance, if taken

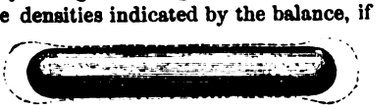


Fig. 4.

singly, do not correctly represent the electric distribution. This source of error was avoided by Coulomb in the following manner. He touched two points on the body successively, and determined the electric density at each ; and then, after an interval equal to that between the two experiments, he touched the first point again and obtained a second measure of its density, which was less than the first, on account of the dissipation of electricity. If the densities thus observed be denoted by A and A′, and the density observed at the second point by B, it is evident that $\frac{A}{B}$ is greater, and $\frac{A'}{B}$ less than the ratio required. Coulomb adopted, as their correct value, their arithmetic mean $\frac{1}{2}\frac{A+A'}{B}$.

The distribution of electricity on a conductor of any form may be roughly described by saying that the density is greatest on those parts of the surface which project most, or which have the sharpest convexity, and that in depressions or concavities it is small or altogether insensible. Theory shows that at a perfectly sharp edge, such, for example, as is formed by two planes meeting at any angle, however obtuse, but not rounded off, the density must be infinite, and *a fortiori* it must be infinite at a perfectly sharp point, for example at the apex of a cone, however obtuse, if not rounded off. Practically, the points and edges of bodies are always rounded off ; the microscope shows them merely as places of very sharp convexity (that is, of very small radius of curvature), and hence the electric density at those places is really finite ; but it is exceedingly great in comparison with the density at other parts, and this is especially true of very acute points, such as the point of a fine needle. The consequence is, that if a pointed conductor is insulated and charged, the concentration of a large amount of repulsive force within an exceedingly small area produces very rapid escape of electricity at the points. Conductors intended to retain a charge of electricity must have no points or edges, and must be very smooth. If of considerable length in proportion to their breadth, they are usually made to terminate in large knobs.

When an insulated conductor is charged and left to itself, its charge is gradually dissipated, and at length completely disappears. This loss takes place partly through the supports, and partly through the air.

As regards the supports, the loss occurs chiefly at their surface, especially if (as is usually the case) they are not perfectly dry. It is diminished by diminishing their perimeter, and by increasing their length ; for example, a long fibre of glass or raw silk is an excellent insulator.

As regards the air, we must distinguish between conduction and convection. Moist air, and highly rarified air probably act as conductors ; but with air that is relatively dry, the loss is probably chiefly due to contact and convection. Successive layers of air become electrified by contact with the conductor, and are then repelled, carrying off the electricity which they have acquired. It is by an action of this kind that electricity escapes into the air from points, as is proved by the wind which passes off from them. Particles of dust present in the air, in like manner, act as carriers, being attracted to the conductor, charged by contact with it, and then repelled. They also frequently adhere by one end to the conductor,

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and thus constitute pointed projections through which electricity is discharged into the air.

Coulomb deduced from his observations on dissipation of charge, a law precisely analogous to Newton's law of cooling, namely, that when all other circumstances remain the same, *the rate of loss is simply proportional to the charge*, so that the charges at equal intervals of time form a decreasing geometric series. Subsequent experience has confirmed this law, as approximately true for moderate charges of the same sign. Negative charges are, however, dissipated more rapidly than positive.

A NEW ELECTRIC LIGHT.

[From the London Standard, April 9.]

The York road, Lambeth, is not precisely the place from which one would expect a new light to shine forth upon the world, but yesterday evening no sooner had the sun disappeared sufficiently far below the horizon than passers by were astonished by having thrown upon them a glare of light as white as that of the moon, and apparently almost as intense as that of the solar sphere. Following up the light as it poured down a side street, one came to the gate of an engineering factory, just within the limits of which stood the apparatus whence the brilliant rays streamed. To all intents and purposes the light seemed that of an ordinary electric machine greatly intensified. There were the wires bringing and carrying off the current; there was the concave reflector and there were the bits of square coke which act as wicks or poles. But every one who is accustomed to judge of the intensity or the illuminating power of the electric light must have seen that the relative proportions were those of Venus, or at least Jupiter, to an asteroid. Inquiry was not courted, but information was not refused; and it turned out that this light, wasting its glories on a Lambeth lane, is one of the chief scientific achievements of the last two or three years. A number of gentlemen and a few ladies were present by private invitation to witness the demonstration of the powers of this new arrangement of electric power which, there seems to be little doubt, has overcome all, or nearly all, the technical difficulties that have stood in the way of utilizing electricity both for lighting and for heating. Indeed, one may almost say that the problem has been solved—how to produce cheap electricity. Some of the most eminent of our men of science are said to have examined the apparatus and to have declared the results far beyond any hitherto achieved. The light thrown from half-inch carbon points into the York road last night was fully equal to that of 7,000 candles, and we are informed that a light equivalent to 10,000 or even 14,000 candles has been produced. But the great value of the light is that it is constant. The current is absolutely unintermittent. The machine acts without a commutator, and consequently there is not only no intermission, but there is no variation. What the light is at the end of the first five minutes it is at the end of the hour, or so long as the carbon points remain unconsumed, and the process of the production of the current is so simple that it is marvelous that it has not been before discovered. Two or two-and-a-half-horse power are ample to produce the rotation of three bobbins or broad-edged discs covered with copper wire, and acting upon six pairs of soft iron parallel bars, similarly covered. Magnets are entirely dispensed with in the production of the power, which is derived altogether from friction, there being no battery brought into the circuit in any shape or form. The amount of the electrical current of the machine at work last night was estimated as equal to that of 500 Bunsen's cells, and the inventor is now making a larger one to equal 1,000 of the same cells, for the purpose of performing at a rapid rate some of the most important operations of manufacturing chemistry. Thus he proposes to produce chemically pure copper, which is now worth from three to four shillings a pound, at the cost of ordinary commercial copper; potassium and sodium at less than half their present price; alluminum, now at seventy-five shillings per pound, at thirty or thirty-five, and magnesium, calcium and other rare metals at prices which will bring them into commercial use. But even in its application to the purification of iron alone there would seem to be an immense field for the use of electricity, the inventor of this machine having the courage to declare that he will purify two tons of pig-iron from phosphorus, sulphur, carbon and silica in eighteen to twenty minutes, at a saving of two-thirds of the coal. On this point no opinion can be expressed, but everything seen last night certainly tends to the probability of such a triumph. Thus a platinum wire of about eighteen gauge was melted in forty seconds, and a copper wire in less than two. A piece of solid steel screw, four or five inches long, was burnt away in about five minutes, and a piece of diamond has been vaporized in a few seconds. So constant is the current, that one of these machines, experimentally supplied to the Telegraph Department, has been for some time creating the power by which the whole of the London district wires are worked. Last night, in the works of Messrs. Whieldon, Lecky & Co., engineers, though a machine shop full of benches and tools is not precisely the place most favorable to scientific demonstration, those who were present by invitation or accident saw enough to convince them of the very great future before this machine, which, so far back as July, 1871, received the marked approval of the Academy of Sciences in Paris. It is understood that the light—which last night, with only a strength of three or four thousand candles from small points in the interior of the works, made a jet of gas throw a distinct though ghostlike shadow on a whitewashed wall—will be publicly exhibited soon after Easter in London, as well as in the Vienna Exhibition, where it will be tested thoroughly under the personal superintendence of its inventor, M. Gramme.

OZONE.—Knowing as we do that electric currents passed through air generate Ozone; that variations in the electrical condition of the atmosphere, accompanied by discharges, are continually occurring; that storms, showers, lightning, waterspouts, hurricanes, etc., are all concerned in furnishing the air with a principle which gives it chemical activity; that Ozone is produced during slow oxidations at ordinary temperatures (which processes are incessantly carried on around us); and that papers uninfluenced by any other known agent undergo the same changes when exposed to the atmosphere as those which are effected in them by air artificially ozonized; we are undoubtedly justified in coming to the conclusion that some good grounds have existed for the belief in the existence of Ozone in the atmosphere. Only very recently, however, has our knowledge concerning this body been sufficient to enable us to state positively that an affirmative reply should be given to the question with which this section commences. The experiments of Schonbein and other German observers, of Professor Andrews, which have been confirmed and extended by the author, indorsing as they do the prior researches of Houzeau, now place the matter beyond all doubt.—*From Ozone and Antozone, by C. B. Fox.*

ELECTRICITY A MEANS OF DETECTING DEATH.

Dr. Rosenthal, of Vienna, reports a number of cases, and also a series of experiments upon animals, which illustrate the important aid afforded by electricity in furnishing a tolerably certain test for determining death. This sign is the contractility of the muscles in response to the application of the electric stimulus. By the aid of this test, it is affirmed that the diagnosis is rendered easy in cases of suspended animation, arising from apoplexy, suffocation, drowning, etc. It will be found also of practical utility, it is thought, upon the battle-field, and in time of extensive epidemics, when the danger of infection necessitates the speedy burial of the dead. Among the cases quoted is that of a hysterical young woman, aged twenty-four, who had lain for thirty-two hours, evincing during this time most of the ordinary signs of death. Some suspicions having been aroused, however, as to her actual condition, to settle all doubts, it was decided to summon Dr. Rosenthal. He found, upon his arrival, that the face as well as the entire surface of the body exhibited the marble pallor peculiar to the corpse, while the skin was everywhere cool to the touch. Upon raising the eyelids, both the pupils were found to be equally contracted, and showed no appreciable reaction to the influence of light. The upper and lower extremities were relaxed, and when raised, fell like any dead weight. No pulsation of the heart was perceptible to the touch, nor of the radial arteries at the wrist. Upon applying the stethoscope to the heart, however, the room being perfectly quiet, he was able to make out a suppressed, intermittent beat. The thorax, when uncovered, was found to be motionless, but upon carefully watching the abdomen, an exceedingly weak and slow motion could be detected in the lateral walls. The ordinary respiratory murmur was not heard. Dr. Rosenthal now applied his proposed test, and found that the various muscles responded readily to a feeble excitation, so that he was able to give the assurance that the case was one of suspended animation. In accordance with his directions, therefore, heat was applied to the body, and vigorous friction maintained, the result of which was, that at the end of forty-eight hours the woman gradually recovered the power of speech and motion. She stated that during the first part of her lethargy, she was perfectly unconscious, but afterwards overheard distinctly the remarks of those about her, with regard to her death, without the power, however, of being able to make any motion, or emit the least sound.—*Weiner Med. Presse.*

TELEGRAPHIC IMPROVEMENTS IN MEXICO.

In relation to the telegraph in Mexico, the following is contained in President Tejada's inaugural address delivered at the opening of the Mexican Congress, on the 4th of March:

"The great convenience resulting from the extension of telegraph lines has also received careful attention. The improvement of the line to Matamoras, which opens communication from abroad, has been secured. The construction of a telegraph which will put the Capitol of the Republic in communication with the interior, by way of Toluca, Maravatio, and Acambar, has been brought almost to a conclusion. The line connecting Durango with Calchihuites has been purchased. The construction of the telegraph to connect Minatitlan with Tabasco is actively progressing."

A CHINESE junk was recently seized at Hong Kong having on board some stolen telegraphic cable, supposed to be a portion of the great Northern line.

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TELEGRAPHIC SIGNALING THROUGH SUBMARINE CABLES.

At a recent meeting of the Institution of Civil Institution of Engineers and Shipbuilders in Scotland, held in the Natural Philosophy class-room of the University of Glasgow, an illustrated lecture was delivered by Sir William Thomson on the above-named subject.

The eminent professor explained and illustrated the method of submarine signalling by using a model cable, the mirror galvanometer, and the syphon recorder in its most recent form. He commenced by referring to Faraday's explanation of what is called the inductive retardation of signals in a submarine cable. The wire constitutes, as it were, the inner coating of a Leyden jar, the gutta percha or india rubber takes the place of the glass, and the water touching the outside of this represents the outside coating of the jar. Faraday showed that if several thousand Leyden jars were distributed along an aerial line of telegraph, each with its inside coating connected with the telegraph wire, and outside coating with the earth, the signals through the line would exhibit exactly the same inductive retardation as those sent through the actual submarine line. Mr. Cromwell Varley had devised a beautiful practical method for realizing this suggestion. He first made condensers of sufficient capacity to represent the submarine line. A dozen or so of these condensers distributed along the line of resistance coils, according to Faraday's rule, gave the electrostatic capacity to which the inductive retardation is due. In these condensers in a moderate compass a large number of sheets of tin-foil, packed closely together with insulating material between them in order, gave, by the great amount of surface thus got, and the thinness of the coating, the enormous amount of electrostatic capacity (*quasi* Leyden jar capacity) which is necessary to represent a few miles of submarine cable. By these condensers, applied properly to resistance coils, Mr. Varley constructs what he calls an artificial line, and such a line was supplied to him by Sir William Thomson, with capacity equal to the French cable, and resistance equal to four times that of the conductor of the cable, that is to say, equal to about 10,000 miles of such a conductor as that of the French cable. The degree of inductive embarassment of the French cable on account of its great strength—about 2,500 miles—is greater than that of any other cable except those between Suez and Aden, and between Aden and Bombay, which in that respect are about equal to the French cable, because, although of shorter length, their conductors are of less weight per mile. Thus the appliances exhibited may be represented as a model of any of these three cables. The signals through this model were shown by means of a mirror galvanometer with the lime-light, throwing an image on a horizontal scale at a distance of nine feet from the mirror. After making simple right and left signals, the lecturer showed that, by pressing down one key on the transmitting instrument, the spot of light was sent slowly to the right or left, reaching an extreme deflection after several seconds of time, and remaining there as long as the key was held down. He then showed a repeated succession of signals to the right and left, groups of these constituting letters. He next explained the essence of submarine telegraphy in making another signal without waiting for the end of the preceding, and the interpreting by eye and memory, when reading from the spot of light, what the complete deflections would have been if they had been made separately. The same signals were shown on the syphon-recorder, an apparatus by which a syphon of very small bore is made to record the signals in ordinary ink on ribbons of paper. It was afterwards shown that in sending direct from the battery, and receiving through a condenser, there was a great quickening of the signals, and the interposing a condenser at the sending end diminished the amount of deflection, but quickened it very considerably. The application of this quickening method on the syphon-recorder has also been shown.

A CRUEL JOKE.

Yesterday evening a gentleman called at *The Express* office to say that a report was current that a servant woman in the city had drawn the capital prize of $75,000 in the Omaha lottery, the drawing of which took place on Monday. The gentleman asserted that he was not trying to "April fool" any one, and so a reporter was dispatched to learn the truth of the report.

The supposed lucky one lives in a boarding-house on Main street. The reporter succeeded in getting an interview with her. He told her the report in circulation, and asked if it had any foundation. She rummaged in her pocket and brought forth a package of paper, which she unrolled carefully. It enveloped a telegraph dispatch of the Pacific and Atlantic line, which read as follows:

"OMAHA, NEB., April 1, 1873.

"To Miss——— ———, Terre Haute, Ind.:—Ticket No. 466,324 drew the capital prize of $75,000. Answer.

"MAURICE DALE, Head Clerk."

"Now," said the woman, "when I got the dispatch I went to the office to see if there was any joke about it. There was two men in the office, and they both told me that they'd swear that the dispatch came from Omaha just as it reads."

This all looked honest, and the eyes of the reporter glistened with the prospect of a first-class sensation. He asked the woman all about her history. He was rejoiced to learn that she was born in the same township with himself. He spoke in the most reverential terms of all her kinsfolk that he had known in his earlier youth. He dropped a tear silently over the memory of her Uncle Bill, who died many years ago. Many admiring boarders looked on. Never was more profound respect shown to a human being than was accorded to the lucky one. The l. o. waxed really eloquent as she looked upon her admiring auditory.

"I always was the luckiest woman that I ever see," said she. "I drawed a prize of $300 with a one-dollar ticket in a New York lottery once."

Then all looked upon her more admiringly than ever.

The reporter finally asked permission to take the dispatch to the telegraph office to see if it was genuine. He went to M. Riehle, the operator of the P. & A. Line, who assured him that the dispatch was bogus—that he furnished a blank to a young man, in the morning, who wrote the dispatch.

"But," said the reporter, "the woman says that you told her here that the dispatch was genuine."

"Yes," said Riehle, "the young man who wrote it was standing here when she inquired. He told her that it was genuine, and I had to back him."

The reporter took the dispatch back and told the woman that she had been hoaxed. It was really distressing to see her disappointment.

If the Pacific and Atlantic Line desires to have the confidence of the business public it will dismiss the operator who has made such humorous use of its message blanks.—*Terre Haute Express.*

LOCKWOOD'S MODIFICATION OF THE DANIELL ELEMENT.

The principal advantages claimed for the Lockwood battery are constancy and ease of management. Owing to the complete separation of the solutions, and the almost entire absence of local action resulting therefrom, the consumption of sulphate of copper and of zinc is very slow, and only in proportion to the work actually done, and from the same cause the saturation of the zinc solution is also greatly retarded. The internal resistance of the battery remains almost absolutely unchanged after the first few days, until the entire charge of sulphate is converted into metallic copper, which occupies several months, and the strength of current, as shown by the galvanometer, does not vary perceptibly during this time.

A recent test made of three different batteries, of 11 cups each, showed the following result: One of these batteries had been set up only a few days; another had been set up and kept on short circuit 60 days, and the last had been up and upon a line circuit measuring 95 ohms, continuously closed, for the same length of time. The variation of the internal resistance of the three, at the end of this time, was ·9 ohms, the first showing a resistance of 42·00, the second 42·9, and the third 42·1 ohms.

The copper element consists of two concentric coils of copper wire bolted on either end of a copper standard, the direction of one coil being reverse to that of the other, the sulphate of copper crystals not touching the upper coil. The zinc element is substantially the same as in other gravity batteries.

ECONOMIC VALUE OF SCIENCE.

It is noticeable that scientific subjects have received more attention from the newspaper press of late than formerly. This is partly owing to the efforts of scientists towards popularizing their respective specialties, as exemplified in the recent course of lectures in this country by Professor Tyndall. But there is another and more potent reason for it. In the scramble for wealth or the conveniences of life, the utility of knowledge is esteemed more than its speculative quality of abstract truth. It is becoming more generally known that discoveries, that seemed at first to be without any application to the wants of mankind, have at length, through the higher development of commerce by means of them, contributed to the general good. Experiments in magnetism and electricity, which led to the invention of the electric telegraph, were made from curiosity only. The modern chemist takes little note of the monetary value of his discoveries; but the practical man presently finds their application to some use that has its equivalent in dollars and cents. None could have anticipated the use of spectrum analysis to the arts, and yet it is found invaluable in the manufacture of steel.

Many other instances may be noted to illustrate the proposition that every addition that may be made to physical science is capable of an economic use, and that the practical value of all the knowledge we now have may appear with further discovery.

For such reason science is likely to receive increased attention from the practical, money-making world; but a real love of knowledge for its own sake is the characteristic of few, and we must expect that a very large portion of mankind will pursue the truth merely for the purpose of knowing it.—*The Typographic.*

M. JAMIN calls attention to the fact announced by Treve, that the poles of a magnet remove farther from the extremities when an armature is applied.

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CORRESPONDENCE.

To the Editor of the Journal of the Telegraph:

Very few Morse operators would admit that their alphabet is an unsafe one for two thoroughly competent and careful operators to work by, and probably none would question the fact that errors in telegraphing have been found where spaced characters occur, and it would seem impossible to make exactly such blunders with the Continental alphabet, consequently we conclude that the fault is partly with the spaced characters and partly from a lack of judgment on the part of the operator.

If the objection to spaced charaters is removed, then we have but one weakness to deal with, viz.: the judgment of the operator.

The Continental alphabet appears particularly suited to operators of ordinary capacity, which class is largely in the majority.

I believe two intelligent operators could, in two hours, become practically proficient in the Continental alphabet. Errors would not be increased by the change, because the operator's mind would be more directly upon his work from the fact of there being a change.

There would be no confusion of the two systems, any more than persons speaking two languages would run one into the other, except by way of explanation, which would be apparent at the time. The Continental alphabet was arranged by experts, and is the result of long study, which no one will claim for the Morse.

It has been suggested to Americanize the Morse, by supplying plain characters for the spaced ones, leaving all others as at present arranged. This is a step in the right direction; but as the telegraph is universal and not sectional, it appears to me, if we change at all, it should be made universal.

We need something to prevent the ridiculous blunders made by telegraphers. The adoption of the Continental alphabet will not cure all, but it will certainly reduce them.

Telegraphing is an attractive business, being neat and novel, its development unparalleled; consequently many persons have adopted the profession who are wholly unfit by nature or education for this service, and from present indications we may look for little improvement in that quarter.

Admitting the Morse system is safe and more rapid in the hands of experts than the Continental, any alphabet would be equally so for them—but we have to deal with the large majority of operators who are not, and, further, who never will be, experts; but in changing the alphabet we do not strike at the root of the matter.

Our telegraph managers should extend inducements for experienced competent operators to remain in the service; one way to do it would be by a gradual yearly increase of compensation, based upon merit.

This is done in other professions. Telegraphing is not a trade which a person can become proficient in by three or four years' service—progress in telegraphing is illimitable, and we should see greater progress made were the inducements for application and ability properly appreciated.

Why does a young operator of two or three years experience command equal pay with one who had devoted ten to twenty years to the service? It is because he can manipulate as well, his judgment not always being considered. The experienced operator has no encouragement beyond a certain limit, to which point the young operator has arrived, and there they both stick. I believe if our financial men, and from president down to managers, would give more intelligent consideration to the details of a telegraph line, they would be surprised to learn to what an extent this point has been overlooked.

D.

LEXINGTON, ILL., April 26, 1873.

To the Editor of the Journal of the Telegraph:

As it appears you wish to hear the opinion of operators in general on the contemplated introduction of the "European alphabet," allow me to express a few opinions in its favor, as it appears to me. It is argued by some of your correspondents that the only fault of our present system is, "operators do not write and receive it correctly," which idea, I think, is perfectly correct. Were it transmitted and received correctly, there would be no necessity to make any change; but the very fact that it is not, and never has been, is proof that it never will be, as the chief requisites of correctness are not in it—I mean simplicity; and the seemingly wholesale charge made against operatives of carelessness in writing, is not, in my opinion, going in the least to stop it. The Company have excercised all the care possible in the matter, have issued explicit and stringent rules on the subject, and yet the abuse goes on. I think the Company owe it to their own interest to introduce a system that will at least help to remedy this evil, since it is impossible to *compel* their employés to take the necessary care in avoiding mistakes; and, as the business will continue to be done by the same class of irritable and careless men (as your correspondent *Reform* would have us believe we were), it is hopeless that their temper and inclination will suddenly become perfect, so that they will in future prevent any error. But supposing they did, the proposed change would but add to their efforts, and then we would have a happy and almost faultless system and fraternity. The argument that some of the characters are painful to make and some of the numerals even frightfnl to look at, shows a disordered state of the nerves and diseased brain, and such petty and selfish motives must not be admitted as an argument, when paramount interests of such weight are at stake; and, as the most difficult letters are of the most rare occurrence, and the letters which are used the most are of the most simple construction, there can be very little objection on that account. I think *all* the operators in the W. U. Company employ can, in two weeks, make the change; and although at first could not as readily and as quickly transmit and receive, yet the inconvenience would only be of a few days' duration. After, we would all feel much more safe as to errors, and the length of the new letters would more than compensate for the time lost in spacing the old ones.

R. H. McLEAN.

To the Editor of the Journal of the Telegraph:

To be brief in expressing an opinion in relation to the proposed change in a part of the alphabet, I would simply say that I think "Reform," in the last number of the JOURNAL, has hit the nail squarely on the head. The difficulty lies not nearly so much with the Morse alphabet, as the manner in which it is transmitted. When operators learn to form the characters as they should be, with the proper spacing between letters and words, the complaints of errors will be few and far between. I have been at the key of an extremely busy railway line over ten years, and have never found cause to wish for a change in the alphabet, but daily see the necessity of improvement in the sending. The Morse characters are easy enough to receive, when properly sent, and I would rather see the Company begin at the true root of the evil than to be taking on European airs.

OLD STYLE.

JAMESTOWN, Pa., April 11, 1873.

To the Editor of the Journal of the Telegraph:

I notice that the subject of changing the Morse Alphabet is being considerably agitated among the members of the telegraphic fraternity. Now it seems to me that the discarding of the system of signals that have been in successful daily use for over a quarter of a century, and adopting the European instead, is the height of folly, and I think the majority of practical telegraphers throughout the country are of the same opinion. Of what benefit would it be to use the same alphabet as Germany? No operator would be capable of taking charge of an office in Germany unless he first became familiar with the language of that country. The same remark will apply equally well to all foreign countries. It is claimed that a majority of the "*bulls*" that are made is on account of the spaced letters. Admitting this to be true, although we can see no reason why it should be if the Morse characters are properly transmitted, and that a change is essential, then does it necessarily follow that we are obliged to draw upon the talent of Europe for the remedy? Most emphatically it does not. The telegraphers of America have always found themselves equal to any emergency, and we are strong in the belief that they are equal to this. As far as our personal experience extends, we have always found it an excellent rule to let well enough alone. But if a change we needs must have, let us exhaust our home resources first, and not resort to foreign aid until we prove ourselves unequal to the task. EXCELSIOR.

PHILADELPHIA, April 23, 1873.

To the Editor of the Journal of the Telegraph:

I notice in your last issue considerable "kicking" against the proposed change of alphabet. Now, I do not see why any operator should have anything to say against the change, for the following reasons: 1st. After committing the European alphabet to memory, it is much easier and quicker transmitted over the wire, with less errors, than the spaced letters now in use; and, 2d, all the errors which chiefly occur from spaced letters would be done away with. I notice the correspondent who signs himself "Reform" speaks of there being no end to errors in case of change. Now, I differ with him there; my opinion is just the contrary. I do not see how there could possibly be any errors at all. I say, give us the new alphabet; bring it generally into use, and I will bet there will not be many operators who would change back again after it has been in use a couple of months. I think, if operators would look into the matter right, that those who would be opposed to the change would be few and far between. For my part, and the benefit the telegraph companies would derive from it, I say, bring the European alphabet generally into use before many months.

R. W. C.

MUNCY, Pa., April 18, 1873.

To the Editor of the Journal of the Telegraph:

I would like to say a few words in defence of the old Morse Alphabet. Since the subject has been brought forward I have talked to a number of operators, and all are down on a change. In my opinion it will only create more confusion, take more time, and what for? Only to be like Europe. It seems to me American people are going crazy on the subject of aping Europe; hope the W. U. Tel. Co. will pass through the epidemic unharmed. America can take care of herself in all things. If I could see any improvement, then I'd say adopt it at once, the sooner the better. I was a plug once, the ordeal is still fresh in my memory; don't want to go through it again. Cling to the old love; it is better than a new one. Respectfully, M.

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CINCINNATI, O., April 29, 1873.

To the Editor of the Journal of the Telegraph:

There is, and perhaps justly so, a great hue and cry about our Morse Alphabet. Some of your correspondents advocate a change to that one used in Europe. This cannot be urged on the ground of universality, for that is out of the question, as it would leave the Russians out in the cold, as their alphabet is different from any other; and why make it necessary for us to learn an almost entirely new alphabet, when all that is wanted is to rid ours of its spaced letters. If we adopt the European alphabet the confusion must be great. For instance, we have a combination for the letter "C;" now, if we use the European letters we transpose this by the letter "J," and the "J," in turn, must be arranged by the transposition of some other letter, or by the formation of an entirely new combination. Thus, we see, there are *three* things to cause confusion to re-arrange but *one* letter, and, as there are eleven letters and no character "&" in that alphabet, we would have twelve times three, or *thirty-six* things to confuse us. Would it not be better to give us an entirely new alphabet of our twenty-six letters, and thus save us ten "confusions?" Universality of the alphabet is out of the question so long as the Russian language is used in telegraphy—and how about the "Heathen Chinee?" C. S.

CLINTON, Ia., April 24.

To the Editor of the Journal of the Telegraph:

I believe that a change of alphabets will result in injury to the Company, and to the public at large. To be brief, I have been a telegrapher 22 years, one year of which a "Bain" opr., and I am positive that an alphabet so full of dashes is more difficult to transmit correctly than our present one, and requires more time. Furthermore, I am satisfied, after careful examination, that there cannot be a better alphabet than the old "Morse. Every character, however rapidly made, strikes the ear with that rythm and harmony that any other fails to do; and if this be the case, the alphabet is not blameable for errors. It is the stupid, heedless operator. IOWA.

MT. STERLING, Ill., April 25, 1873.

To the Editor of the Journal of the Telegraph:

Eighteen years ago I entered the telegraph office at Frankfort, Ky., in the good old days of "short circuit," with "J. D. R." as our Supt., and such experts as Leonard, Rutherford, Trabue, Fisher and Taylor as operators. Since then, many and rapid changes have taken place in the art "*Telegraphique*," and though I am not at the present writing engaged in the business, I have watched with great interest the onward march of the old South-Western until it became finally absorbed by the unconquerable "Western Union," who certainly deserve great credit for the rapidity with which they have so far met the advance of civilization in extending their wires all over the Union. I have noticed, with some interest, the various pro and con arguments in the JOURNAL regarding the change of alphabets, and from my extensive acquaintance in telegraph circles, as well as practical experience, am forced to the conclusion that any change from our old alphabet would result in but little, if any, benefit to the public, and would most assuredly greatly incommode any Company adopting it, and, as some of your correspondents say, "make first-class plugs of now first-class operators;" or in case any change is made, I would most respectfully suggest a change be made *only* in the spaced characters, and not the entire Morse system. I am, however, satisfied the Western Union will not adopt any change without giving its operators a fair time to prepare themselves for it.

R. L. RUSSELL.

SANDY FLAT, Cal., April 23, 1873.

To the Editor of the Journal of the Telegraph:

In your issue of April 1st is an inquiry from Cowan, Tennessee, concerning the consumption of material and the attention required by the Callaud battery, when used as a local. The writer of the article asserts that the zincs must be cleaned over in every ten days. It is now just nine months since I put up two cups of Callaud to run a very poor sounder in this office, and during that time they have consumed but five pounds of bluestone and a tablespoonful of sulphate of zinc. The zincs first used are still working, and appear to be but a trifle smaller than they were originally made, and during their term of service have not been cleaned or disturbed in any manner whatever; nor has the battery been taken down or examined, except to observe the condition of the zincs. Perhaps the professor at Cowan could save himself a few rubs by permitting himself to gradually become less industrious, thereby giving his local a wholesome rest.

STANISLAUS.

To the Editor of the Journal of the Telegraph:

A is a connecting office between two companies. B is a Western Union office. C is an office of the connecting company. B sends a message addressed John Johnson, Angletown, *via.* C, 10 words, collect. Connecting company refuse positively to receive this message unless check changed on the copy from collect to paid, as they can only deliver the message by mail. W. U. rules say, "check on message must not, under any circumstances, be changed." The customer at B, when notified that message is stopped at A, wishes to pay the tolls and have it forwarded. What should W. U. managers at A and B do in this case, which is one of frequent occurrence? Please reply in JOURNAL, and oblige,

KIMMER.

Answer.—It is hard to believe that such cases are of frequent occurrence. The Receiver should not have taken a message collect to a point at which there was no office. The office at which the error occurred should be notified to collect the charges, and the message should be entered as paid and be forwarded to its destination. The spirit of Rule 77 does not apply to cases of this description.

To the Editor of the Journal of the Telegraph.:

Has a relay office a right to dispute a D. H. message? Is it not the duty of the office which is its destination to refuse it, if it is refused? Please give me your advice.

Answer.—No office, be it relay or terminal, has a right to refuse to receive or to deliver any message which is offered when the proper form of numbering and checking is observed. It makes no difference whether such message is paid or free.

MONTPELIER, Vt., April 23, 1873.

To the Editor of the Journal of the Telegraph:

Suppose I receive a message for Mr. A. requiring an answer, and it is promptly delivered. He cannot answer it, but sends the carrier, instead of going himself, to Mr. B., who can answer it. "You will find him," he says, "at his office." Away goes the boy, patiently and faithfully, but only to be sent by the clerk in B.'s office to Mr. C.'s house, still further away.

Now, was not the whole duty of carrier, manager and company in the case, done, when the message was first delivered to Mr. A.? STRIKER.

Answer.—Yes. Too much time is spent and too many service messages transmitted in endeavoring to induce people to send answers before they have anything to say.

TIFFIN, O., April 10, 1873.

To the Editor of the Journal of the Telegraph:

Executive order No. 146, reads—"No replies to stamped messages will be sent free, unless the signal 33 is contained in the check."

Supposing "A." sends a message to "B." 12 D. H. stamp. Parties at "B." offer an answer and refuse to pay for it. Should it be sent *Collect*, and is "A." responsible for the tolls?

Answer.—Under these circumstances the office at B. should require that the message offered as an answer should be prepaid. The receiving clerk should, however, courteously advise the sender that the matter will be immediately presented to the Superintendent, and the tolls will be refunded if improperly collected.

Anonymous.—When a person who is staying temporarily in a place, expecting a message, and who, leaving before it arrives, desires that it should be forwarded to him to some other point, the office to which such request is made should require the usual guarantee. No other course would afford adequate protection to the Company.

H. W. G.—To become an operator, it is necessary to have a practical education in the art. Theoretical knowledge only can be derived from books. Your penmanship is good enough.

G. W. S.—No half-rate message can be received for less than twenty-five cents. It follows that when a half-rate message is offered for a station to which the full rate is thirty-five cents, the charges for seventeen words will be no greater than for any less number.

R.—The courtesy of the officers of the Western Union Company allows the social messages of their employés, under certain restrictions, to pass free over the lines. Such being the fact, the issuing of franks to them is unnecessary.

M. and D.—We cannot inform you as to the chances for an operator's position in England. You had better address Mr. R. S. Culley, London, England. The salaries paid to first-class operators in England do not average more than forty dollars per month, and are still less in other countries of Europe. Neither in pay nor in social position is the condition of operators in Europe at all to be compared with those in America.

W. U. T.—When a message, which has been received free, is delivered, your whole duty has been performed. If the message should be offered to another Company for transmission to a point upon their lines, they would probably treat it in accordance with their rules, with which the Western Union Company have no concern. This Company does not guarantee the charges upon such business.

An Opr.—Sulphate of copper and sulphate of zinc are salts of different metals. The former, commonly known as blue vitriol, is a salt formed by roasting the native sulphuret of copper, or by dissolving the protoxide in dilute sulphuric acid and crystalizing by evaporation. The latter, sometimes known as white vitriol, is formed by the action of dilute sulphuric acid on zinc. They are as distinct in substance as the metals forming their base.

B. K.—Any person engaged in the business of telegraphing is eligible for membership in the Telegrapher's Life Association, and, in the event of his leaving the business, he can retain his connection, subject to the same conditions as when he became a member.

J. B. H.—In a Daniell's cell it is the copper crystals which are formed upon the copper cylinder, and upon the outside of the porous cup, that is valuable. The black or reddish deposit upon the zinc is valueless.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
May 15, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Hereafter the tariff for Other Lines to Grand Forks and Sheyenne Crossing, Dac., will be 175 and 12 from Chicago, Ill.

Laurel, Del., re-opened.

Manteno, Ill., closed.

Opdyke, Ill., re-opened.

Tamaroa, Ill., closed.

Augusta, Ind., closed.

Kendall's Mills, Me., changed to Fairfield.

Kingston, Md., re-opened.

No. Dighton, Mass., closed.

Hereafter the "tariff for Other Lines" to Audubon, Georgetown, Glyndon, Hawley, Lakeside, and Moorhead, Minn., will be 175 and 12 from Chicago, Ill.

Marion Station, Miss., closed.

Alexandria, Neb., closed.

Business for Drakesville, Dayton and Englishtown, N. J., will hereafter be checked direct.

Lake Mahonk, N. Y., will be re-opened June 1; "tariff for Other Lines" 25 and 2 from New Paltz, N. Y.

The P. O. A., of Phillipsville, N. Y., is Belmont Station, Phillipsville.

Emerald, O., re-opened; square 241.

Hughes Station, O., closed.

Lockbourne, O., closed.

The P. O. A. of Adamsburg, Snyder Co., Pa., is Beaver Springs, Snyder Co., Pa.

Business for Penn Haven Junction, Pa., will hereafter be checked to Penn Haven.

Business for Bristol Ferry, R. I., will hereafter be checked to Fall River, Mass.

Cedar Hill, Tenn., closed.

Ophir, Utah, re-opened.

Fortress Monroe, Va., re-opened; check direct.

Business for the following Other Line Offices in Wy. will hereafter "Leave this Line" at Bryan. Tariff for Other Lines 50 and 8 from Bryan for Bitter Creek, Black Buttes, Point of Rocks, and 65 and 4 for Red Desert and Table Rock.

NEW OFFICES.

* Crystal Springs, Dac.,	175	12	307	Chicago, Ill.		
* Eckelson, "	175	12	307	"	"	
* Edwinton, "	200	13	307	"	"	
* Frog Point, "	175	12	307	"	"	
* Fourth Siding, "	175	12	307	"	"	
* Jamestown, "	175	12	307	"	"	
* Maple River, "	175	12	307	"	"	
* Eleventh Siding, "	175	12	307	"	"	
318 Ashmore, Ill.						
336 Princeville, Ill.						
327 Weldon, Ill.						
386 Fayette, Iowa.						
11 Fairfield, Me.						
11 Pittsfield, Me.						
85 Mt. Airy, Md.						
* Crookston, Minn.,	175	12	307	Chicago, Ill.		
409 Vermont, Mo.						
516 Carleton, Neb.						
516 Fairfield, Neb.						
* Hannibal, N. Y.,	25	2	74	Oswego, N. Y.		
* Red Creek, "	25	2	74	"		
* Rose, "	25	2	74	"		
* Sodus, "	25	2	74	"		
* Wallington, "	25	2	74	"		
* Wolcott, "	25	2	74	"		
180 Glenville, O.						
242 Mauds, O.						
211 Rocky Ridge, O.						
233 So. Lebanon, O.						
59 Hatborough, Pa.						
66 Hazardville, Pa.						
76 New Cumberland, Pa.						
66 Penn Haven Junction, Pa.						
25 Coventry Centre, R. I.						
* Sulphur, Texas.....	50	4	470	Marshall, Texas.		
	75	5	510	Sherman, "		
31 Quechee, Vt.						
141 Farmington, W. Va.						
160 Littleton, "						
141 Texas, "						

Half-rate messages may be taken for and received from the following offices on the Virginia Telegraph Line:

Strasburg,	Va.,	Mt. Jackson,	Va.
Edenburg,	"	New Market,	"
Front Royal,	"	Piedmont Fauquier, Co.,	"
Harrisonburg,	"	Plains,	"
Leesburg,	"	Woodstock,	"

WILLIAM ORTON, *President.*

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, May 2, 1873.

EXECUTIVE ORDER, No. 147.

Rule 94 is hereby modified as follows:

No original sent message, or duplicate of a received message, will be allowed to pass out of the possession of the Company, except by authority of an Executive Officer.

Whenever a manager or other employé is subpœnaed on the part of the sender or receiver of a message, to produce it before a court or other legal tribunal, he will comply with the subpœna, and afterward return the message to the files. When subpœnaed by any party other than the sender or receiver, he will take the message into court and submit to the Judge that he ought not to produce it, the communication being privileged, and that he cannot do so unless a rule of court is entered requiring it. If such rule is entered the manager must obey it, asking the clerk to give him a copy of the rule and message.

The subpœna and other papers in connection therewith should be retained on file with the message to which they relate.

WILLIAM ORTON, *President.*

ANOTHER CABLE TO CUBA LAID.

From Key West, Fla., under date of May 13, we learn that a new cable has been successfully laid between that point and Havana, Cuba.

THE CALIFORNIA AND TEXAS RAILWAY CONSTRUCTION COMPANIES' TELEGRAPH.—The California and Texas Railroad Construction Companies' telegraph line is already constructed and in operation from Marshall, Texas, to Sherman, Texas, passing through the northern tier of counties in that State. It was completed on the 16th of March last, and has upon it eight offices. Mr. Max Elser is chief operator, with his headquarters at Marshall. The line connects with the Western Union Company. It passes through the best cotton growing region of Texas, and is 218 miles in length.

BORN.

BOUER.—At Leetonia, O., April 24, 1873, to M. A. Bouer, Manager W. U. Tel. Office, a daughter.

CLEMANS.—At Urbana, O., April 22, 1873, to L. T. Clemans, Manager W. U. Tel. Office, a daughter.

JONES.—At Freedom, Ind., April 24, 1873, to J. H. Jones, Manager W. U. Tel. Office, a son.

MARRIED.

HANNUM—MCALLISTER.—April 24, 1873, at the residence of the bride's parents, at Circleville, O., Mr. J. C. Hannum, Agent and Operator at Groveport, O., to Miss Anna McAllister.

WESTERVELT—ASHWORTH.—At Corpus Christi, Tex., April 19, 1873, G. W. Westervelt, Manager W. U. Tel. Office, to Miss Kate Ashworth of Indianola.

DIED.

ECKERT.—At Washington, D. C., May 1, 1873, Elwood D Eckert, youngest son of Thomas T. Eckert, Genl. Supt. of the Western Union Telegraph Company. The remains of the deceased were taken to New York for interment.

HICKS.—At his residence in Cleveland, Ohio, May 2, 1873, from a stroke of paralysis, George B. Hicks, aged forty-two years.

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKNOWLEDGMENT OF RECEIPTS FOR ASSESSMENTS 39, 40 AND 41, UP TO MAY 11.

The acknowledgment of receipt of any assessment is to be understood as an acknowledgment for all previous assessments:

4	5	17	19	26	44	51	69	70	75	80
82	83	93	95	97	101	108	114	129	148	
176	177	181	185	186	187	189	190	191	193	197
198	200	201	202	218	225	227	240	247	248	255
267	273	278	279	281	282	283	285	294	297	302
311	323	332	347	353	378	381	385	388	392	393
418	425	441	466	467	468	469	470	471	474	475
476	481	483	484	511	512	514	515	520	527	533
546	556	557	560	566	569	574	575	584	590	592
602	603	604	605	618	628	630	632	646	648	656
670	672	678	679	680	684	694	695	697	700	701
702	703	705	710	717	725	730	733	734	735	766
772	775	778	781	782	783	785	786	796	802	808
809	812	815	825	836	838	841	848	855	859	869
871	880	883	899	901	905	906	908	911	915	926
927	930	931	932	939	941	942	944	980	991	992
996	998	1000	1002	1011	1014	1016	1028	1041	1043	1047
1058	1063	1071	1080	1085	1098	1100	1101	1103	1109	1134
1135	1136	1141	1144	1145	1146	1152	1170	1175	1178	1191
1196	1198	1201	1205	1207	1209	1210	1213	1215	1217	1226
1227	1228	1237	1238	1239	1240	1241	1251	1255	1262	1263
1264	1267	1278	1279	1281	1288	1284	1285	1286	1287	1288
1292	1294	1307	1308	1309	1311	1312	1313	1314	1315	1317
1318	1319	1320	1321	1322	1325	1339	1340	1342	1344	1346
1348	1349	1350	1351	1352	1353	1354	1355	1358	1366	1372
1376	1385	1386	1387	1389	1390	1391	1393	1400	1405	1407
1412	1413	1415	1417	1418	1421	1425	1426	1427	1428	1430
1431	1432	1433	1437	1438	1439	1449	1451	1453	1454	1455
1456	1457	1458	1464	1465	1466	1468	1469	1470	1471	1474
1475	1476	1477	1481	1482	1483	1485	1489	1500	1501	1503
1504	1506	1507	1513	1514	1526	1532	1539	1541	1542	1543
1546	1554	1555	1556	1557	1559	1562	1564	1569	1570	1580
1586	1589	1596	1598	1599	1600	1601	1603	1604	1605	1606
1607	1608	1610	1611	1612	1613	1614	1616	1617	1619	1630
1621	1625	1630	1633	1634	1639	1640	1641	1642	1643	1646
1649	1651	1652	1653	1654	1655	1657	1660	1661	1662	1663
1665	1666	1669	1670	1671	1672	1673	1674	1680	1681	1682
1683	1689	1690	1691	1692	1694	1700	1701	1702	1703	1704
1706	1714	1722	1736	1739	1741	1745	1746	1747	1748	1749
1763	1764	1773	1774	1775	1776	1778	1780	1785	1790	1794
1795	1796	1797	1804	1805	1818	1822	1823	1824	1825	1826
1828	1832	1833	1834	1835	1836	1843	1844	1845	1846	1850
1862	1863	1864	1866	1867	1868	1871	1872	1873	1882	1883
1884	1885	1886	1898	1899.						
8	22	27	29	30	31	33	41	55	58	76
84	89	100	111	120	126	136	139	141	142	144
154	156	158	160	164	206	230	237	238	242	246
252	254½	256	258	275	288	303	328	330	344	357
359	362	364	366	371	372	376	379	382	398	411
412	451	453	455	457	482	565	617	649	676	690
712	714	716	723	724	728	729	737	738	743	780
804	820	823	851	856	897	904	949	954	955	956
957	958	959	960	963	964	966	979	1001	1006	1026
1030	1031	1032	1033	1034	1039	1040	1042	1044	1050	1057
1072	1099	1105	1106	1107	1108	1110	1112	1113	1115	1117
1119	1120	1121	1122	1123	1125	1130	1131	1139	1153	1167
1190	1193	1194	1211	1221	1224	1234	1135	1268	1269	1270
1290	1327	1328	1388	1399	1406	1416	1450	1452	1459	1461
1462	1479	1486	1498	1502	1505	1510	1528	1529	1530	1563
1572	1573	1585	1597	1609	1667	1696	1707	1715	1716	1717
1726	1727	1731	1732	1733	1734	1742	1750	1751	1752	1753
1754	1755	1756	1757	1758	1759	1760	1761	1762	1765	1766
1767	1768	1769	1770	1771	1772	1777	1786	1787	1889	1792
1793	1806	1807	1808	1813	1820	1821	1827	1829	1830	1831
1837	1838	1854	1857	1858	1859	1860	1874	1875	1876	1877
1878	1879	1880	1887	1888	1889	1890	1891	1892	1895	1896
1897.										

ASSESSMENT No. 39.—800 934.

ASSESSMENT No. 40.—1699.

We are notified of the death of James R. Dunlap, certificate No. 1520, which occurred at Grafton, W. Va., on the sixth inst. He died of acute rheumatism, and leaves a wife and two children. This is the first death in our ranks since that of Thurber, which occurred March 13th. Notices of Mr. Dunlap's death will be issued in due season.

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FOREIGN TELEGRAPHIC ITEMS

BRITISH-AUSTRALIAN TELEGRAPH COMPANY.

The fourth ordinary meeting of the British-Australian Telegraph Company was held on Monday, April 21, when the directors' report was adopted. The meeting was then made special, to authorize the transfer of the business and property of the Company to a new company, to be called the India, Australasia, and China Telegraph Company, on conditon that this last-mentioned Company also acquire the business and property of the British-Indian Extension Telegraph Company, Limited, and of the China Submarine Telegraph Company, Limited. This is, in fact, carrying out the amalgamation of the British-Australian, the British-Indian Extension, and the China Submarine Companies, which has been for some time past advocated by several of the most influential shareholders in each of the three companies. The proposed terms of amalgamation are as follows: To issue to the shareholders of each Company, in exchange for their shares, fully paid-up shares of £10 each in the new Company in the following proportions: For each share in the British-Australian Telegraph Company, £11 in the new Company; for each share in the British-Indian Extension Telegraph Company, £15 in the new Company; and for each share in the China Submarine Telegraph Company, £11 in the new Company. These relative proportions are based upon a computation of the present relative value, and an estimate of the prospects of the several companies, and the directors of this Company consider the terms fair and equitable. The shareholders at the meeting also took the same view of the matter, and expressed their unanimous approval of the amalgamation, and also the terms proposed. It was not possible, however, to formally carry the resolution for an amalgamation, inasmuch as, after the registration of the new Company, it was discovered that its title was almost identical with the title of a company registered some years ago, and therefore it becomes necessary to slightly alter the name of the new Company. This will be done at once, and in a few days a formal meeting will be called to again submit the resolution for the approval of the shareholders. This will be purely a matter of form, as the meeting to-day unanimously sanctioned the amalgamation.

CHINA SUBMARINE TELEGRAPH COMPANY.

At the ordinary meeting on Tuesday, April 22, of the China Submarine Telegraph Company, a dividend of one-half per cent. and a bonus of one per cent. were declared, making a total of 4½ per cent. for the six months. The question of the amalgamation of this Company with the British-Indian Extension Company and British-Australian Company was brought before the meeting, and the terms of the proposed amalgamation were unanimously approved. Another meeting will, however, require to be held to legally carry the resolution for amalgamation, inasmuch as, since the notice convening the present meeting was issued, it has been discovered that the title of the new Company, which has been formed to take over the property and business of the above-named three companies, is almost identical with that of a company registered some years ago, and therefore it becomes necessary to re-name the proposed new Company. The directors have it in contemplation to call it the Eastern Extension, Australia, and China Telegraph Company. A meeting will be called in a few days, when the resolution sanctioning the amalgamation will be submitted.

THE PROPOSED GREAT TELEGRAPH AMALGAMATION—THE "GLOBE" PROJECT.

This week the holders of Telegraph property have given one more, and a very striking proof of their determination to combine for the protection and good management of their property; they have shown that they both see in what direction their real interest lies, and are resolved to pursue it. On Wednesday last there were held, at the Cannon-street Hotel, informal meetings of the shareholders of the Anglo-American and French Atlantic Telegraph Companies, with the express object of making such representations to the respective Boards as shall expedite the carrying into execution of the too long deferred project of Amalgamation. The opinions elicited upon this occasion were unanimous in favor of a complete consolidation of all the Atlantic Cable interests; and we must say that we heartily endorse the decision at which the assembled shareholders have arrived.

On all grounds amalgamation is to be recommended, inasmuch as it means unity and economy of management, and general security to the property. And the public are equally interested in a favorable solution of the matter, for it is only by this means that a perfectly trustworthy communication can be kept up, and low tariffs be finally established. The prosperity of the Telegraph shareholder means finally low tariffs, and his adversity means a rise in charges as against the public, as, indeed, the events of this very week have shown.

On Wednesday the assembled shareholders not only pronounced unmistakably in favor of immediate amalgamation, but they proceeded to resolve, almost unanimously:

"That in the opinion of this meeting, the scheme of the Globe Telegraph Company is well calculated to accomplish the object contemplated by the first resolution, and this meeting regards it, under the direction of the gentlemen whose names have already been announced, with such additions from the other Boards as might be thought desirable, as preferable to any other yet brought before the public."

The "Globe" plan has been examined by us before, and considering the weighty character of the names already attached to it, we cannot wonder at the support which it has met with, or at the opinions expressed that the existing Boards will do well to throw over any plans they may entertain, and adopt this one. Whom are telegraph shareholders to follow, unless it be such men as Messrs. Pender, M.P., Julius Beer, Cyrus W. Field, and C. W. Siemens, Sir James Anderson, Sir Daniel Gooch, M.P., Captain Sherard Osborn, and Baron Julius De Reuter? All these names are now identified with the Globe Telegraph Company, the Board of which thus embraces some of the best constituents of the Boards of all the telegraph lines. Such men as these will doubtless be found able to bind together, as it were, the at present disjointed telegraphic links, and to bring the telegraph system of the world under one powerful organization.

With reference to the prices at which the various Cable shares are to be merged into the Globe Telegraph Company, we understand that the Globe Directors are giving this matter their earnest attention, and that their decision with regard to the several valuations will be made known within a comparatively few days. It is satisfactory to learn that the basis of the valuation is an essentially just one—namely, the earning power of the various lines. By this means every shareholder will receive his undoubted right. We are also glad to learn that the Globe scheme will embrace the plan of a division of the capital into Preferred and Deferred Stocks—a plan whereby the requirements of the several classes of investors are effectually met.

Altogether, we think the great cause of efficient telegraphy has taken a great step forward this week, as a result of the meetings to which we have referred, and we congratulate the proprietors thereupon.—*The London Money Market Review*, April 26.

BRITISH-INDIAN EXTENSION TELEGRAPH COMPANY.—A dividend of 4 per cent., and a bonus of 1 per cent., were declared on Tuesday, April 22d, at the meeting of the British-Indian Extension Telegraph Company, making a total dividend for the year of 11 per cent. The shareholders also unanimously expressed their approval of an amalgamation with the British-Australian and China Submarine Companies.

THE WEST INDIA AND PANAMA TELEGRAPH COMPANY.—It is understood that the Telegraph Construction Company's repairing vessel would sail early in May to repair the Porto Rico and Jamaica Cable, and also to effect any other necessary repairs. In addition to this, negotiations have been opened with the Samana Bay Company to secure their active co-operation for connecting San Domingo with the West Indian Company's system of Telegraphs by the laying of a Cable from Samana Bay to Porto Rico. The heavier work, however—viz., the line from Jamaica to Panama—is being rapidly proceeded with, with every prospect of completion before the contract time.

MESSRS. Grant Brothers & Co., London, announce that the half-yearly Coupon No. 2, due 1st May, on the Seven Per Cent. First Mortgage Building Bonds of the Western Union Telegraph Company of the United States of America will be cashed at the fixed exchange of 4s. per dollar, equal to £7 per coupon (less income-tax), on and after that date at their banking-house.

MEETINGS of the British-Australian Telegraph Company, the British-Indian Extension Telegraph Company, and of the China Submarine Telegraph Company, were called for the 5th May, to pass resolutions for voluntary liquidation, and transfer of the respective undertakings to the "Eastern Extension, Australasia, and China Telegraph Company, Limited."

THE traffic receipts of the Submarine Telegraph Company for the three months ending the 31st of March amounted to £24,230, and for the corresponding period last year to £25,122.

IN consequence of a convention the Italian Government has agreed to work the telegraph lines belonging to the Sardinian Railway Company.

THE traffic receipts of the Eastern Telegraph Company for the month of March amounted to £33,572, and for the corresponding month in the previous year to £29,178.

THE Italian Chambers have approved a project for laying down a submarine telegraph line between Brindisi and Egypt.

IT is expected that telegraphic communication by cable between Portugal and Madeira will be opened in July.

THE total number of messages forwarded from the postal telegraph stations in the United Kingdom during the week ended April 5, 1873, was 326,563—an increase on the corresponding week of the previous year of 68,744.

THE total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ended April 12, 1873, was 292,506—an increase on the corresponding week last year of 13,301.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, MAY 15, 1873.

ATTENTIVE AND RETENTIVE READERS.

The JOURNAL is fortunate in the class of readers which it addresses with such regularity twice in a month. Very little it says to them is lost, and this is rendered painfully evident when it is caught tripping. To be brief, within the past few months we have, in reply to correspondents, given decisions diametrically opposed, upon substantially the same question, and from a half dozen quarters we are called upon to "rise to explain."

In our issue of Dec. 2nd, 1872, in reply to G. R. S., we decided that "St. James Hotel" should be counted as two words. According to Rule 9, names of persons and places, when given to things, must be counted according to the number of distinct words in each, and surnames, containing any prefix, are to be counted as one word. St. James, being a surname, is one word, and Hotel being one word, and both being applied to designate a thing, must be counted according to the number or distinct words in each, viz: two.

And in reply to C. P. McAllister, April 15th, 1873, we stated there are thirteen words in—"I desire to meet you at the St. James, at nine thirty to-night." Rule 9 says: "Names of persons and places, where given to *things*, must be counted according to the number of distinct words in each."

The latter is the correct construction of the rule. St. James is a surname, without doubt, and when used for that purpose should be counted as one word, but when surnames are used as titles to *things* the wording of the rule is explicit—they must be counted according to the number of distinct words in each.

MANAGERS of offices which are worked under the commission system, should, in returning their monthly statements, show plainly upon the vouchers for service, the computation by which the amount due is arrived at.

THE color of the complimentary stamps for 1873 is blue.

Executive Order No. 147, modifying Rule 94, appears on page 182.

EFFICIENCY OF THE WESTERN UNION TELEGRAPH COMPANY'S LINES AND SERVICE.

Notwithstanding the fact that the Western Union Telegraph Company, in its relations to the people of the United States, enters into and has become necessary in its intermediary character to the general business of the country, its *personnel*, beyond a few leading names, and the means employed to maintain its lines and service at the present high standard of efficiency, is, except to a comparative few, a matter of entire ignorance. Very few of those whose necessities compel them to use the telegraph know or even give a passing thought to the labor and the intelligent skill which has rendered it possible to communicate their ideas and thoughts to remotely distant points with such invariable certainty. They leave their messages as a matter of ordinary business, confident that within a very limited period of time the contents will be in the hands of their distant correspondent. The invention of the electro-magnetic telegraph rendered this possible, but the perfect fruition of this possibility has never been experienced until within a very late date. Morse brought forth the bantling, but its present strength and perfection is due to others.

The efficiency of the telegraph service at this day is undoubtedly as greatly due to the condition of the lines, as conductors of electricity, as to the machinery of transmission. It is not very long ago when a continued heavy storm of rain, or what is still worse, a dense mist such as frequently occurs along the Atlantic coast, was almost as disastrous to telegraphic communication as a complete breakage of the wire. What with escapes, sympathetic currents, and other kindred troubles which regularly made an appearance on a moist day, instruments were rendered useless, and all communication consequently suspended. In our own experience with the House system, on a wet day, it has been only with the utmost skill and patience that we were able to send or receive messages between Portchester and New York, points distant only twenty-eight miles, while with Stamford, eight miles further, nothing could be done—we were unable to break him or he us. That this trouble was not due to the system we then operated is made plain by the fact that with the Morse relay upon the railroad wire between New York and Philadelphia, not ten years ago, after a twelve hours rain, it was impossible at New York to hear an office beyond Jersey City, and it is only within the last five or six years that this condition of the lines has been improved. Down to that period, each superintendent of a district kept the wires in order in his section. Nothing more was attempted or even expected. Defective insulation and bad joints in the wire utterly precluded the possibility of working more than three or four hundred miles in one circuit, except when the wire was newly erected.

These difficulties and troubles are now unknown. This result followed the action of the Western Union Company in placing under the charge of one person all matters relating to the construction, maintenance and equipment of its lines. The wires are kept at a regular standard of efficiency. Joints and splices of the wires are soldered. Insulation is made perfect by the use of non-conducting substances suitable to the atmospheric and other influences, which vary in different sections of the country. The resistance of the magnets are measured, and the strength of the batteries made to conform to the resistance of each circuit. These improvements render telegraphing as mere child's play, when compared with the labor of operators not a dozen years ago. It should be understood that whatever renders the transmission of telegraphic signals more easy to the telegraphist constitutes a gain to the public, not only in causing dispatches to be transmitted with greater speed and certainty, but in allowing them to be sent at a cheaper rate.

In operating its lines the Western Union Telegraph Company make use of two systems—the Morse, and a combination of the printing telegraph instruments invented by Royal E. House and David E. Hughes, respectively. The printing system, however, is employed to a limited extent only. Fully nineteen-twentieths of the business is done with the Morse. The ingenious arrangement of wires and circuits known as the duplex system, by which messages are transmitted in both directions upon the same wire, at the same time, is largely employed by the Company. This invention has practically doubled the capacity of the lines.

The maintenance of the service at the present standard, and the never-ending extensions of the lines in order to keep pace with the development of the country, requires the employment of a force which, in point of skill, is unequalled in any other business. The high rate of salaries paid by the Company for skilled labor has developed and drawn into its service an amount of ability superior to that upon any other system of lines in existence, while the management has been so wise and so practical that this body has become knit and bound together, so that the power and influence of the combined intelligence and skill is as though it was embodied in one person.

The affairs of the Company are managed by an Executive Committee, chosen by the Board of Directors, composed in part of the President and Vice-Presidents. This Committee controls the appointment and rate of compensation of all employés, and maintains a general supervision over every department of the service. The territory covered by these lines is separated into four Divisions, called respectively the Eastern, Southern, Central, and Pacific, each of which is in charge of a General Superintendent; and these Divisions are subdivided into Districts—of which there are twenty-nine in the United States and the British Provinces—each under the immediate control of District Superintendents.

The Electrician of the Company has charge of, and is responsible for the maintenance of the lines at the standard of efficiency established by the Company.

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All matters pertaining to construction and reconstruction and the maintenance of the wires at a uniform degree of conductivity, also the machinery used in the transmission of messages, both as to form and power, and also such other matters as would properly pertain to the office, is under control of the Electrician. To this officer is referred all machinery offered for the service of the Company.

The Western Union Company have established and maintain offices at almost every town and village in the country not reached by the lines of the companies with whom they connect, it being an established rule to open an office at any place through which their lines pass where the receipts will equal the expenses. If such a result appears doubtful, the guaranty of a few responsible citizens against loss is accepted.

Nearly 8,000 persons are upon the pay-roll, operating about five thousand offices, and in all the principal cities of the country the telegraph is available every hour of every day and night from the beginning to the end of the year.

THE TELEGRAPH IN AUSTRIA — LETTER FROM MR. GEORGE B. PRESCOTT.

VIENNA, April 18th, 1873.

MY DEAR SIR: In Austria a differently constructed telegraph system from any other yet seen on the Continent is found. In France, Belgium and North Germany cross-arms are not used, the insulators being fastened directly to the poles, but in Austria the cross-arms again appear. They consist of round sticks of wood, of about three inches in diameter, apparently the natural timber with the bark taken off, and unpainted. When many wires are carried two poles are used, which are joined together at the top, and separated at the bottom about five feet, thus forming what the English call an A pole. The cross-arms are alternately fastened upon each side of the pole, as they are in England, a preferable plan to ours where they are all placed on the same side. In Vienna the wires are carried on iron poles, no underground wires being employed either here or in any part of Austria. The pole is made of cast-iron, and is very ornamental. It consists of an iron column about twenty feet in height and one foot diameter. The lower end is screwed to a stone base. At the top of the column a horizontal arm extends about two feet on either side, and from the ends there extend two vertical shafts fifteen feet in height, thus constituting an iron column with two branches, resembling a candlestick holding two candles. The two upper shafts support eight iron cross-arms, and each cross-arm carries eleven wires, so that each pole carries eighty-eight wires. The poles are about one hundred and thirty feet apart. The line presents a very fine appearance, and does not disfigure the fine streets through which it passes. In aerial structure it surpasses anything I have ever seen in the telegraphic way. The Government has only one office in Vienna for transmission of despatches, but it has eleven offices at which messages are taken in, and from which they are sent to the transmitting office by messengers. There is a private company, however, the "Weiner Privat Telegraphen," which has about sixty stations in Vienna, and forty in the vicinity. This company obtained the privilege of constructing and operating lines from the Government, and is doing well. Last year it divided 80 per cent. Its wires run into the Government office, and deliver messages for the latter, receiving therefor 10 kreutzers (5 cents). For messages received, transmitted and delivered in the city it charges 15 kreutzers, or 7½ cents. For messages sent into the country 25 kreutzers, or 12½ cents. This private company connects with the banks and newspaper offices, who furnish their own operators. The market reports are copied on slips, and are carried about by boys, who offer them to passers by.

The Austrian territory is divided into two telegraphic zones. The charge to the first is 40 kreutzers, and to the second 60. The male operators receive from 600 to 1,000 guldens or florins ($300 to $500) per annum. The female operators from 250 to 350 florins (from $125 to $175) per annum. In addition they both receive half a kreutzer (quarter of a cent) per message as a commission for their work when employed on the Morse, and three-quarters of a kreutzer on the Hughes. Two clerks are employed on the Hughes, one to operate and the other to count the words in the message, and to paste the strip and attach it to the blank. They employ no envelope, but fold up the blank, leaving the address on the outside.

In Vienna there are 21 Hughes and 79 Morse instruments, and to work them there are employed 86 female and 235 male operators. The number of employés to do a given amount of work is always strikingly greater in Europe than in America. There is none of that hurry and bustle which we see at home. This is particularly marked in Vienna. Every one smokes his cigar leisurely, bows politely, takes his hat off to a superior, touches it to an equal or even an inferior, and never seems to think there is anything worth fretting or hurrying about. The Director-General comes to his office at 12 or 1, and gets through at 3. In the offices everywhere, and at all times, everybody smokes. The operators at the instruments, the clerks at the desks, all smoke, and there is a cloud of smoke everywhere. In fact, from the Director-General to the porter there is no exception, and even the soldier on guard at the palace solaces his lazy hours with the indispensable weed. In Berlin, there was an exception to this almost universal German custom in the telegraph offices. No one was allowed to smoke there, the Director-General being too good a disciplinarian to permit it. In Vienna they are building a splendid telegraph office. The walls and roof are already up, and they are now at work upon the interior. The building is five stories, and is built of stone resembling the Nova Scotia free stone, but of a better quality, and highly ornamented. In front there is a sculptured figure of Time, and a group representing the Telegraph. The building will cost 800,000 florins, or $400,000. It is square, and has an inner court also square, and admits light from four sides, without and within. The operating room is on the top floor, and occupies three sides of the building. On the front the operating room is 160 feet in length and 23 feet in width. On the two sides of the building the operating room is 150 feet in length and 23 feet in width, making in all a room 460 feet in length and 23 feet in width. The lower floors are all to be used for the various purposes of the telegraph. On the opposite side of the street they are erecting a splendid Exchange, and adjoining it a new post-office. These are to be connected with the telegraph by a pneumatic tube, and a pneumatic tube will also convey the messages to the operating room from the receiving office.

The Austrian Administration are just about to adopt the stamp system of paying for the transmission of messages, they having hitherto done nothing in this way. The Director-General thinks it will be a great improvement.

Yesterday, through the kindness of Gen. Van Buren, I visited the Exposition Buildings. They are very grand and splendid, being several times as large as those at Paris, but they are yet very far from completion. Scarcely anything has yet been taken into the buildings, and it will be many weeks before the whole will be in proper shape for exhibition. Indeed the great dome is yet in a state of construction, and if they get this and the grand entrance in proper condition for the opening they will do well. The probability is that the opening will take place on the first of May, as announced, and then it will be closed for a month. This is Gen. Van Buren's opinion. The grounds about the Exposition are already covered by hundreds of side shows, among which there are wax works, fat women, giants, dwarfs, and the numerous other *novelties* usually to be found at great gatherings. In the mean time the publicans are waxing fat, and the poor stranger is taken in and fleeced. Prices are enormous for everything. At the opera, on Tuesday, as much as $25 was paid for a seat; this was partly owing to the fact that the royal family was to be present. On Sunday the Emperor's daughter is to be married to the brother of the King of Bavaria, and much excitement exists here in consequence.

We leave for Berne to-morrow morning. I have got some valuable maps and statistical documents from the department here.

Yours truly,
GEO. B. PRESCOTT.

Hon. WILLIAM ORTON, *President.*

TELEGRAPH POLES NOT LIABLE TO DUTY.

The following letter settles the question as to the liability to duty of Telegraph Poles imported from Canada. They are exempt from duty:

"TREASURY DEPARTMENT,
"WASHINGTON, D. C., May 2d, 1873.

"SIR: In reply to your letter of the 30th ultimo, I would state that if the telegraph poles referred to are imported in the ordinary condition as cut, whether with or without the bark on, they are exempt from duty under the provisions in the 22d section of the Act of July 14, 1870, for 'round unmanufactured timber not otherwise provided for.'

"I am, very respectfully,
"(Signed,) J. F. HARTLEY,
"*Assistant Secretary.*"

Hon. WILLIAM ORTON,
President, &c., New York.

THE Great Eastern and Edinburgh leave the latter part of this month to lay the cable from Valentia to Heart's Content. The Great Eastern will then return to repair the broken Anglo-American cable, and the Edinburgh will proceed to lay two new cables between Placentia, Newfoundland, and Sydney, Cape Breton.

THE steamer Hibernian left on Monday, the 5th inst., to repair the French cable, which is broken 208 miles from Brest.

AT a telegraph office, early one morning, the young gentleman operator, after repeated calls for a young lady operator in another office, at last gets a response, and then "click, click, click," (fortissimo,) he telegraphs back to her, vehemently: "I have been trying to get you for the last half hour!" In a moment the following spicy reply comes tripping back to him over the wires from the telegraphic maiden: "That's nothing! There is a young man here who has been trying to do the same thing for the last two years, and he hasn't got me yet?"

THE EARTH A GREAT MAGNET.

DR. MAYER'S LECTURE AT YALE.

The directive power of the magnetic needle as illustrated in the mariner's or the surveyor's compass, is a fact of so familiar knowledge that it usually passes, like the rising of the sun or the ebb and flow of the tides, as a matter of course, without exciting any thought of the causes to which it is owing. But a fact much less familiar is, that any light bar of soft iron, without possessing, to ordinary tests, the property of magnetism at all, will, if very delicately suspended (as by means of a single silk fibre from a cocoon) assume, though less promptly than the compass needle, the north and south position; and this the more readily when the point of suspension is a little out of the centre of gravity, so that at rest the bar stands somewhat inclined. A soft iron bar, also of considerable dimensions, may be made to exhibit magnetic properties, or to seem entirely devoid of them, by merely changing the position in which it is held. Even if the bar is not perfectly soft, it will manifest the same variations of condition under corresponding circumstances; but in this case still more remarkable phenomena may be made to appear, for if at the moment in which the magnetic property is most strikingly developed in it, its particles be thrown into vibration by a sudden blow with a hammer, the magnetism will not disappear with change of position as before, but will be permanent. But with a complete reversal of the position, and a second blow applied with precisely the necessary degree of force, this magnetism may be discharged, and the rod brought once more to its neutral state.

All these phenomena, and many more analogous to them, are described in the singularly luminous essay of which the title is given above—an essay which embraces the subject of a letter delivered by Dr. Alfred Marshall Mayer, Ph. D., Professor of Physics in the Stevens Institute of Technology, about a year ago, before the Yale Scientific Club in New Haven, and also, we should judge, a great deal that could not have been crowded into that or into any single lecture. The merit of this essay, which is remarkable, consists chiefly in the beauty of its logical method and the felicity of its illustrations. All the changes of magnetic condition, such as those above mentioned, brought to pass by varying the position relatively to the cardinal points of the compass, of soft or hard iron bars, or by subjecting them to concussion in their different positions, are shown to be such as to imply and to demonstrate the existence of an immense magnetic force in the earth itself, and to show that this force is so distributed in the earth as to give to the planet the character of being itself a great magnet.

The lecturer, in the original presentation of his argument before a public audience, possessed an important advantage in being able, by the aid of the enormously powerful electro-magnet constructed under the direction of President Morton for the Stevens Institute of Technology, to show how a great magnet ought to act upon masses and bars of iron subject to its influence, and upon conductors of electricity set into motion in its vicinity. The lifting power of this apparatus has never been fully tested, and probably could not be without breaking down its supports, and perhaps distorting the apparatus itself; but it amounts to some tons. When it is in action, if a keg of iron spikes be poured out, no matter how carelessly, a few feet above it, it will catch the whole of them in their fall and gather them in a compact cluster around its poles. Such a magnet exerts an influence upon iron rods some feet in length, at a distance as great as the limits of the lecture-room will allow. The lecturer holds such a rod in the position in which the influence of the earth's magnetism is neutral, and shows experimentally that it becomes strongly magnetized if pointed toward the pole of the artificial magnet. He shows, by the test of the compass needle, that the end of the bar directed toward the artificial magnet possesses a polarity contrary to that of the pole toward which it is directed, while the more distant pole has the same polarity. Reversing the bar, he finds its poles also promptly reversed; carrying the needle along the bar, from end to end, he finds that the pole which was at first attracted strongly is drawn more and more feebly until he reaches the middle point, or a point very near the middle, when all attraction seems to disappear; and afterwards, that the opposite pole begins to be attracted, and continues to be more and more so up to the end of the bar most distant from the magnet.

He then exhibits the beautiful phenomenon called the magnetic phantom—a phenomenon produced by sprinkling iron filings uniformly over a thin plate of glass resting horizontally on an artificial magnet, and then giving the glass a sudden jar. The iron filings, every individual particle of which becomes a magnet, seize each other by their correlated poles during the brief movement caused by the jar, and form a series of beautiful and symmetrical curves, which proceed continuously from pole to pole, and form a succession of lines of resultant magnetic force. A small magnetic needle carried along any one of these lines is found to place itself parallel to that line, or rather to take a position tangential to the curve, at every point of which it is placed.

The lecturer then inquires what ought to be the lines of magnetic force in the case of a magnet having the form of a sphere, and as these lines must necessarily be the same in the plane of every meridian of the sphere, he takes a plane disc of steel to represent such a meridian plane, and having magnetized it employs it to produce a magnetic phantom as before. Determining thus the forms of the lines of magnetic force for this case by direct experiment, he is prepared to institute such a comparison between the phenomena of natural and artificial magnetism as shall either establish the fact that the earth is a great magnet, or prove that it is not so.

As to the effects on rods and bars, they are in all respects identically the same whether the known cause producing them is Professor Morton's great electro-magnet, or whether they occur under the influence of the earth's magnetic induction. And as to the forms of the lines of magnetic force surrounding the earth, those, of which the position must everywhere conform to that of the dipping needle, are precisely such as the magnetized steel disc gives, when we place the magnetic poles of the earth where Ross and Wilkes found, or inferred, the dipping needle to be vertical, viz.: in lat. 70° N., lon. 85° W.; and lat. 70° S., lon. 125° E.

Another striking proof of the similarity of physical effects produced by artificial magnets and by the great natural magnet of the earth, is shown by the lecturer to exist in the equal facility with which electric currents are generated by magnetic induction in both cases. Faraday discovered that whenever a conducting body is put into motion in such a manner as to cut the curves of magnetic force, an electric current is generated, provided that the conductor forms a closed circuit. Upon this principle have been constructed the powerful magnetic electric machines, by which the great electric coast-lights are maintained by the British Government at Dungeness Head, and by the French at La Hève. By the rotation of a coil of insulated wire, placed in a position to cut in its movement the curves of the earth's magnetic force, the lecturer produces electric currents which powerfully act upon the galvanometer, and demonstrates the possibility of working a magnetic telegraph without any battery, and by means of electricity derived from the inductive influence of the earth's magnetism alone.

Having pretty well established the fact that the earth is a great magnet, the lecturer gives, toward the conclusion of his argument, some computation of the aggregate energy of this immense magnetic mass. Taking as a unit a steel magnet fourteen inches long by one inch wide and one quarter of an inch thick, magnetized to saturation and weighing one pound, he informs us that, according to Gauss, the earth's magnetism is equal to eight thousand four hundred and sixty-four millions of millions of millions (8,464,000,000,000,000,000,000) of such magnets; and that if this amount of magnetism were equally distributed throughout the mass of the earth, the magnetic intensity of each cubic yard would be equal to that of six of these magnets.

The essay, of which the foregoing sketch embraces but a cursory outline, will be read with pleasure even by those to whom the subject is familiar, and with substantial profit by every young student of physics, not only for the information it contains, but also as an admirable model of rigorous inductive reasoning.

ON MAGNETIC ENERGY.

A communication by M. Cozin to the Academy of Sciences, Paris, on Magnetic Energy (translated and abstracted for the *English Mechanic and World of Science*), treats the subject as follows:

The author has investigated, by experiment, the relation between the quantity of magnetism in the core of an electro-magnet and the magnetic energy. There does not exist, to his knowledge, any theoretical expression of that energy. He has found a very simple relation, analogous to that resulting, for the electric energy, from the experiments of Joule and Reiss, and the principles of thermo-dynamics.

The magnetic energy of a magnet is proportional to the product of its quantity of magnetism by its magnetic moment, or, which is equivalent, to the product of the square of this quantity of magnetism by its polar distance.

This proportion rests on the following facts: When an intermittent current is made to pass in the wire of an electro-magnet, the recent experiments of MM. Jamin and Rogers have demonstrated, in a definitive manner, that the core becomes heated. This heat is created at the interruption of the current; it is due to the disappearance of the temporary magnetism developed by the influence of the current; it is equivalent to the *magnetic energy* acquired by the core, and can serve to measure it.

For that purpose, the core being enclosed in the reservoir of a large thermometer of petroleum oil, and the reservoir surrounding by the magnetizing spiral, the author observed the movement of the liquid in the stem for five minutes before the passage of the current, ten minutes with the intermittent current, and then five minutes after the cessation of the current. Account could thus be taken of the heating action of the surrounding bodies, and, on dividing the effect of the intermittent current by the number of intermittences, the calorific effect of a single intermission is obtained; it is this quantity that measures the *magnetic energy*. It is essential that the core obtain its maximum of magnetization at each passage of the current, which is secured by suitably regulating the interruption. (*Ann. Chim. et Phys.*, Vol. XVII, 1869).

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Concerning the quantities of magnetism and the magnetic moment, here are two simple cases, the verification of which is more simple than that of the general case :

1st. The author has shown before that the position of the poles in an electro-magnet is independent of the intensity of the current; whence it results that, if the intensity only is varied, the magnetic movement is proportional to the quantity of magnetism. The author, in consequence, measured the magnetic moment of the nucleus by the method of Gauss, for the different intensities of the currents, and compared them with the corresponding heating effects, which have been proportional to the square of the magnet moment. Thus, *when different quantities of magnetism are imparted to the core, the other circumstances not changing, the quantities of heat created by their disappearance are proportional to their squares.*

2d. The author placed successively in the large thermometer two tubular cores of different lengths (about 40 and 30 centimetres) and equal bulk, so as to obtain comparable results. With equal quantities of magnetism the magnetic moments of the two cores were proportional to the polar distances, and, measured by the method of Gauss, proportional to the corresponding heating effects. *When the polar distances of the cores is only changed, the heat created by the disappearance of the magnetism is proportional to that distance.* Let m be the quantity of magnetism of the core, l the mutual distance of the absolute poles; the law of the heat created in the cores of the electro-magnets is $Q=k\,m^2\,l$, k being the coefficient dependent on the unities adopted.

We may take, for unity of *magnetic energy*, that of a magnet which possesses the unity of magnetism, and of which the absolute polar distance is the unity. Then $m^2\,l$ measures the *magnetic energy*, and k is the *calorific equivalent* of *the magnetism.* The author hopes soon to give the value of this coefficient. The experiments of which the author gives the conclusions establishes an important analogy between magnetism and the other physical forces.

The two factors of the *magnetic energy* will be the quantity of magnetism and the magnetic moment, whatever that may be.

More of that "Mistaken" Zeal.—A few weeks ago we reported a meeting of London letter carriers, called by the Post-Office and Telegraph Service Benefit Society, at which complaints as to their pay and official treatment were made. It seems that a packet of bills announcing this meeting, addressed to the letter-carriers at the Southwestern District Office, was stopped in transit by the postmaster of that office, and has not since been heard of. The Secretary of the Society has since written three times to the Secretary of the General Post Office, stating the facts of the case, which, he says, is not the only one of the kind, and asking whether the action of the district postmaster was the result of "official orders or instructions," and no reply has been received. This seems like adding insult to injury. In the first place the authorities had no right to stop such a package, but having done so they might, at least, give a civil answer to a respectful inquiry. We understand, too, that every obstacle is being thrown in the way of the proposed petition to Parliament, and that the *employés* who interest themselves most in the movement are interfered with in the most petty manner.—*London Graphic, March* 29.

It is expected that four cables will be working across the Atlantic and five across the Gulf of St. Lawrence before the 1st of September.

SELF-SACRIFICE.

DEATH OF A BRAVE AND NOBLE-HEARTED GIRL.

In Millville died last week, says the Newark (N. J.) *Courier*, a young lady whose brief life was crowned by a brave and noble act, for which her memory should be held in high esteem and reverence by all whom the knowledge of her presence of mind in a moment of peril and determined devotion to the line of duty may come. Lottie Dougherty resided in Millville, and was educated at the Central School. She was one of Professor Culver's most attractive and promising pupils, and distinguished herself greatly in her studies. Last Summer, having studied telegraphing, she accepted a situation at Radnor, a station on the Pennsylvania Central Railroad, and boarded at the Eagle station, a mile or more distant. One evening in April last she was on her way to her station, when suddenly a terrible thunderstorm came up. The office at the Eagle was struck by lightning, the magnet was burned out of the instrument, and great consternation prevailed. Lottie supplied a magnet, though it was not her office. Going to the door, she noticed a large tree uprooted and blown directly across the track. She realized at once the dangerous situation. The Western Express was due in a few minutes, and local trains followed it close. Though all present opposed her resolution, the cool, determined girl, seized the red signal lamp, ran through the fearful storm up the track and swung her light, until she heard the engineer whistle down brakes, and the train was saved. The speed was checked so that the train was not thrown from the track, though it struck the tree with sufficient force to hurl a heavy limb against Lottie's shoulder, hurling her down the embankment into a ditch, and inflicting injuries which might ultimately result in death. Of course the passengers on the train were loud in their expressions of gratitude to her, and a handsome sum of money was tendered, but she refused it, and returning to her office remained on duty all night. She said she had only done her duty, and wanted no recompense of a pecuniary character. Eleven weeks ago Lottie came home to die. Ever since that fearful night she had felt the effect of the terrible blow upon her shoulder —consumption claimed her as its victim. Slowly but surely she faded away, enduring her sufferings in a patient and uncomplaining manner. She had all the attention that loving hearts could give, but she could not be restored to health. On Wednesday she died, surrounded by her family, who were plunged into sad affliction by the early demise of their loved one.

New Wire of the Delaware and Hudson Canal Company.—The Delaware and Hudson Canal Company have recently completed a wire from Ballston, N. Y., to Schenectady, which connects with a wire running over the Schenectady and Duanesburgh R. R. to Quaker Street, on the line of the A. and S. R. R. department of this company.

Portuguese Enterprise for a New Line of Communication.—The Director of the Portugal and Brazil Telegraph Company has had an interview with the King of Portugal. He presented to His Majesty, in an elegant casket, a map of the bed of the Atlantic over which the cable is to be laid, with specimens of the cable which had been selected. The section to extend between the Portuguese coast and Madeira will be completed by the manufacturers in June.

The production of musical sounds from magnets, by Dr. Page, was effected in 1837.

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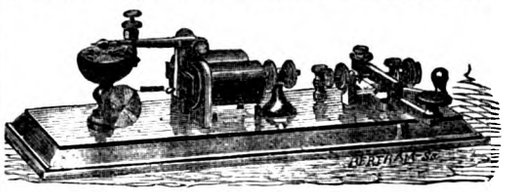
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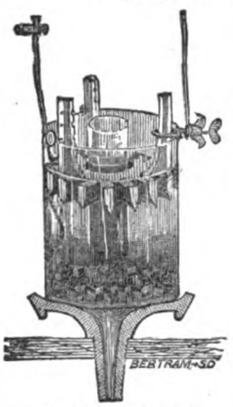
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The Electrician of the Western Union Telegraph Company, Mr. Prescott, says of it:—"I think your Battery Insulator is very admirably adapted for the purpose designed, and it ought to receive general adoption."

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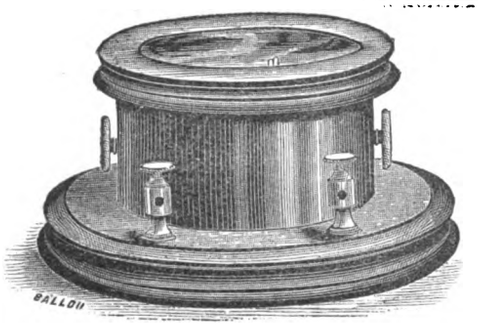
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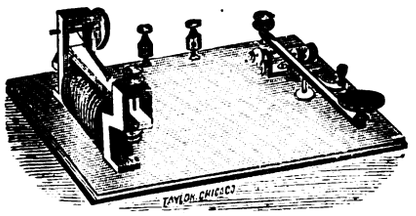
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 13. NEW YORK, JUNE 2, 1873. WHOLE NO. 134.

ELECTRO-MAGNETIC ENGINES.

Electro-magnetic engines are driven by means of the temporary magnetization of soft iron under the influence of a current. This magnetization can be destroyed or reversed with great rapidity; and it is thus possible to produce alternate movements of an armature, which can be readily transformed into other movements by ordinary mechanism. Since 1834, when Jacobi of St. Petersburg constructed the first engine of this kind, many other inventors have tried their powers in the same direction; but none of these attempts have been commercially successful, and the idea of employing such engines for any useful purpose is now almost abandoned.

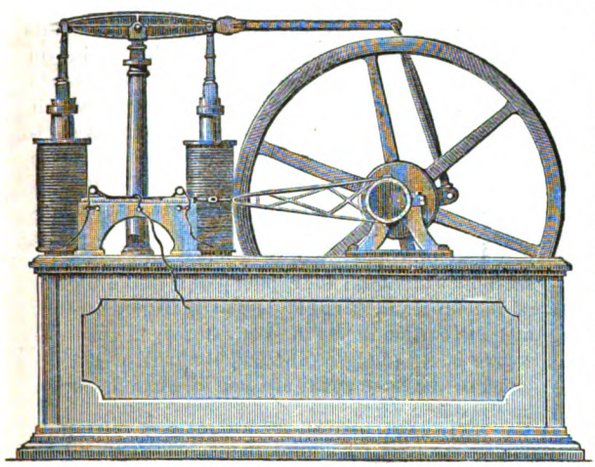


Fig. 1.

The chief reason for this want of success is the greater cost of the material consumed as compared with the fuel of other engines, A pound of zinc costs about fifty times as much as a pound of coal, and if the full equivalent in the form of work could be obtained, both for the coal burned in a furnace and for the zinc consumed in a battery, a pound of coal would yield four times as much work as a pound of zinc. Hence, if the "efficiency" (that is to say, the ratio of the energy utilized to the whole energy expended) of a heat-engine and of an electric engine be the same, the cost of performing a given quantity of work will be 200 times greater for the electric than for the other. It appears, however, that, as regards efficiency, the electro-magnetic engine may have an advantage of about 4 to 1. This would make its work only 50 times as expensive as that of a steam-engine.

Again, inasmuch as magnetic attractions decrease very rapidly with increase of distance, it is necessary for efficient working that the travel of the driving parts should be very small. This is inconvenient from a mechanical point of view.

Lastly, the movement of conductors in a strong magnetic field causes induced currents which strongly oppose the motion.

We shall proceed to describe two of the most successful electro-magnetic engines which have yet been constructed.

In the engine of M. Bourbouze (Fig. 1) the armatures have a reciprocating motion. There are two helices, having soft-iron cores in their interior for the lower half of their length. Two soft-iron rods or plungers travel up and down in the space above the cores, and are jointed to a beam which, by means of a connecting-rod and crank, turns a fly-wheel. The positive pole of a battery is permanently connected with a sliding piece of metal which travels to and fro horizontally, so as to be connected with a terminal of the left-hand or of the right-hand coil, according as it is on the left or the right of its middle position. The upper terminals of both coils are permanently connected with the negative pole of the battery. The reciprocating movement of the slider is produced by an eccentric on the axle of the fly-wheel, like the movement of the slide-valve in a steam engine.

In the position represented in the figure, the eccentric and slider are nearly at the extremity of their range to the left. The left plunger is then at the middle of its down-stroke. When it reaches the bottom, the sliding-piece will be in the center of its travel, and the left-hand coil will just have been disconnected. Immediately afterwards, the right-hand coil will be brought into circuit, its plunger being at the summit of its path; and it will continue in circuit till the plunger is nearly at the bottom. The electro-magnets are thus made and unmade whenever the eccentric passes its highest and lowest positions. On account of the shortness of the stroke, the beam is prolonged to a considerable distance before attaching to it the connecting-rod which drives the crank.

Figure 2 is an illustration of the rotatory engine

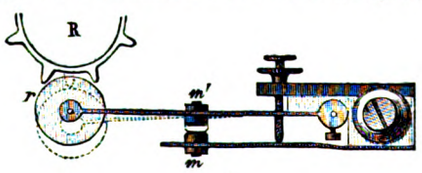


Fig. 3.

invented by M. Froment. It may be described as consisting of a wheel, with eight armatures of soft iron attached to its circumference at intervals of 45°, rotating under the action of four electro-magnets fixed to a cast-iron frame at intervals of 60°. Each magnet is "made" when an armature comes within 15° or 20° of it, and "unmade" as the armature is passing it.

The making and breaking of the circuits is effected by means of three distributors, one of which is shown on an enlarged scale in Fig. 3. R is an eight-toothed wheel, fixed to the axis on which the armatures revolve, and turning with them. Each tooth, as it passes the roller *r*, pushes it away, and brings the studs *m' m* into contact. As long as they remain in contact, the current circulates through the coil with which the distributor is connected. The distributors are screwed into a metallic arc, which is constantly connected with one pole of the battery. One of them serves for the two opposite horizontal magnets, which are made and unmade together. The two lower magnets have one distributor apiece. Matters are so arranged that the current is not cut off from one coil till just after it has commenced to flow in the next. This precaution prevents, or at least mitigates, the induction-spark, which generally occurs in breaking circuit, and which has the mischievous effect of oxidizing the contacts, and thus, after a time, deranging the movements.

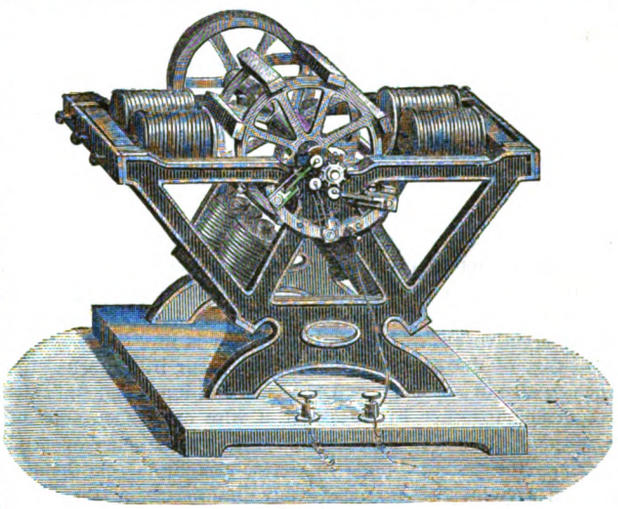


Fig. 2.

NEW ELECTRICAL INSTRUMENT.—Among the recent patents granted here is one to F. H. Varley, London, England, for a novel portable electrical machine. It consists of a glass or rubber rod, having upon it an exciting band or girdle of suitable cloth. A small Leyden jar is attached to the girdle. The rod is held in one hand and the girdle moved with the other. The friction of the girdle upon the rod excites electricity which passes to the jar, and thus a considerable quantity of electricity may be collected. It is a simple and apparently an effective instrument.

NEW CABLE BETWEEN HAVANA AND KEY WEST.—Captain J. Edward Hunter of the British Navy has just completed the work of laying a new cable between Havana and Key West. He used the cable ship Dacia, belonging to the Silvertown Company, and laid the entire new cable from Havana to Key West in fourteen hours, using only ninety-five miles of cable. The previous cables laid for this Company have never measured less than 125 miles. Capt. Hunter did this without any convoy.

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ELECTRO-CAPILLARY CONSTANT CURRENT PILES.

By M. Becquerel.

I have given much attention to the subject of constant current piles since the year 1823, at which time there were none of the data necessary for their establishment. I presented several memoirs on this subject to the Academy of Sciences, and I constructed the first sulphate of copper and nitric acid piles, which I used for the reproduction of mineral substances. The porous diaphragm was merely a plate of pulverized kaolin; this was afterwards replaced by cylinders of half-baked and porous porcelain, which have since been generally used in constant current piles.

When I had discovered the principle of electro-capillary actions,—by which they cause, in the fissures of substances, the reduction of the greater part of the metals, and the production of different insoluble crystalized bodies analogous to those found in Nature,—I sought to apply it to the construction of electro-capillary constant current couples. I made many attempts before I attained the end I intended, in order to avoid counter-currents.

The fundamental principle on which electro-capillary actions depend is the property which the liquids adhering to the surfaces of the bodies, in the capillary spaces, possess of conducting electricity, as do metals and other solid conductors, in the same time that they are decomposed. The consequence of this property is, that when two solutions—one, for instance, of nitrate of copper, the other of monosulphuret of sodium—are found in contact in a capillary space which separates them, such as in a crack in glass, it produces an electric current along the partition in such a direction that the part in contact with the solution of the monosulphuret is the positive electrode, the other the negative electrode. This direction is inverse to that of the current which would occur if the space were not capillary, and the two solutions communicated together by means of a wire or a plate of platinum. This inversion of the current plays one of the principal parts in electro-capillary couples on account that it considerably diminishes the counter-currents. In the electro-capillary couple the deposit of copper is effected on the side of the fissure in contact with the solution of the nitrate; the current produced has great energy, for the resistance that it experiences is very feeble, it having to travel over only an exceedingly short length of liquid.

It is possible to construct two different couples that give the same result. The first couple consists of a glass test-tube containing a concentrated solution of monosulphuret of sodium, in which is plunged a cracked tube filled with a solution of sulphate or nitrate of copper; afterwards another tube was used, having at its base a plug of kaolin. In each of the two metallic solutions was plunged a plate of copper, which was put in communication with a wire of the same metal. There were two currents produced: in the cracked tube the electro-capillary current went from the metallic solution to the monosulphuret; in the second, the current took its rise in the plug during the reaction of the nitrate on the monosulphuret, following the same direction as the first, and adding to the reducing action of the electro-capillary current in the crack. The extremity of the plate of copper which was inserted in the plugged tube is the negative pole where the copper is deposited; the extremity of the other plate is the positive pole, which, in oxidising, renders the current constant when the solutions are maintained at the maximum of concentration. In uniting several similar couples by the poles of contrary name, we form an electro-capillary battery; with three or four couples water can be decomposed by means of two platinum plates. We shall study presently the properties of this battery.

We consider in a battery the electromotive force and the resistance. For the determination of the electromotive force we have used a pile with amalgamated zinc and sulphate of zinc, cadmium and sulphate of cadmium. It has been found that, taking for unity the electromotive force of this couple, that that of the nitric acid couple is evidently equal to five times its force; that of a sulphate of copper couple, three times; finally, the electromotive force of the electro-capillary couple, to 2¼ times; so that these three forces are nearly in the relation of 20, 12, 9; also that the electromotive force of the electro-capillary couple is three-fourths that of a sulphate of copper couple, and nearly half that of a nitric acid couple.

We now come to the second couple, which is more simple than the preceding, and which has the advantage of putting in evidence the causes of the electricity produced in the several parts of which it is formed. We take a test-glass filled with a saturated solution of nitrate of copper, into which we introduce a cracked tube containing a solution of an alkaline monosulphuret, and in this a tube filled with a solution of nitrate of copper; we apply to the exterior of the fissure of the cracked tube a very fine and very narrow band of copper, pierced here and there with little holes, *vis-à-vis* to the crack, so as to facilitate the access of the nitrate solution to that part. This plate is bound on the surface of the tube with a wire of the same metal wound in a spiral. We introduce into the plugged tube a plate of copper, which is put in communication with the wire of the same metal which surrounds the small plate of copper. Immediately, copper is deposited in the crack by the electro-capillary action, and finds itself in contact with the covering; it then acts only as a metallic arc traversed by the current produced in the plugged tube resulting from the action of the nitrate on the monosulphuret by the intervention of the kaolin plug. The two extremities of the metallic arc are covered with the reduced metallic copper, and yet if we pass the current through a galvanometer we see that the two extremities of the metallic covered with copper furnish to the current, the one positive electricity, the other negative electricity. The positive electrode is the end of the plate plunged in the plugged tube, and the negative electrode the extremity of the deposit of the copper in the crack which is in contact with the monosulphuret.

This last reacts upon the metal, whence results sulphide of copper, which is immediately decomposed by the electro-capillary current, with deposit of copper, which gradually increases, forming little protuberances. The plate and the copper-wire are covered equally with copper, because they are in contact with the copper of the crack, or, rather, are prolonged by it: it results from this that we cannot perceive which is the positive electrode. During the electro-capillary decomposition of the sulphide of copper, the sulphur gives itself to the monosulphuret solution, where it forms a polysulphuret, recognizable by its yellow color; in consequence of this reaction the copper of the fissure and of the plate constitute the negative pole of an electro-capillary couple. In the couple that we are describing there was no current produced, whilst there was a deposit of copper in the fissure; the other current is then, so to speak, independent of the first.

The effects produced in the couples, of which we have given the description, are easily explained as follows: The sides of the fissures being conductors of electricity, the current goes from the plugged tube into the fissure by the monosulphuret solution and by that of the nitrate; this direction is the same as that of the electro-capillary current, the action of which is augmented. From what precedes, we see that in electro-capillary couples the plates and wires of copper serve only to establish communication between the several parts of which they are composed. The production of electricity, and consequently of the current, is due to the reaction of nitrate of copper on the monosulphuret in the plug, and to that of the monosulphuret on the copper deposited in the fissure, giving place to a production of sulphide of copper, which is decomposed immediately by the electro-capillary current, this current following the same direction as the first, and causing its inversion. All the effects of which we speak cease when the fissure is not capillary—that is to say, when the copper deposited there becomes widened; in this case there are two currents, in contrary directions, which neutralize each other.

Further, I will describe another capillary couple possessing great energy, and producing at the same time crystallized metallic sulphides, namely, the sulphides of silver, copper, antimony, lead, &c. This couple is formed of a test-glass containing a solution of monosulphuret, in which is plunged two tubes not cracked, opened at the two ends, one of which is plugged with kaolin; the tube containing a solution of nitrate of copper and a plate of the same metal or of platinum or carbon. The other tube is also plugged at the inferior extremity, but with a band of paper wound very tightly around a cylinder, half of copper, half of a metal attackable by the monosulphuret; the copper part is in the interior of the tube and plunged in the nitrate, the other metallic portion in the monosulphuret; the plate of copper of the plugged tube and the part of the cylinder of the same metal are put in communication by a metallic wire.

Following this arrangement, the couple produces two currents in the same direction; the first takes its rise in the plug of kaolin; it enters the copper plate placed beneath (which is the negative electrode), then passes to the composite cylinder, the lower end of which plunged in the monosulphuret is the positive electrode. This is the second source of electricity: the current which it produces acts partly as an electro-capillary and partly as an ordinary current in the same direction as the first. The electro-capillary current exercises its chemical action in the paper plug very strongly. The portion of the plug on the side of the nitrate is filled with reduced copper, and the other side and the cylinder plunged in the monosulphuret are covered with crystals of metallic sulphide.

These couples can form a battery as in the preceding cases. An electro-capillary couple which permits of diminishing the resistance is composed as follows: We take seven simple couples, each surrounded with a small plate of copper; we group six around one in such a manner that all the coppers are in contact. These seven couples are introduced into a beaker containing a solution of nitrate of copper. All the conductors of the same metal which surround the exterior of the cracked tubes are put in communication, the tubes being filled with solution of an alkaline monosulphuret. There is adapted to to the exterior envelope of all the couples a metallic wire; this wire receives negative electricity, and the

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central wire, to which is attached the wires of the plugged tubes, carries positive electricity. I have not yet experimented with this battery.

The couples already employed have an electromotive force for each one equivalent to three-fourths of that of a sulphate of copper couple; they present a very high resistance, so that it is better to unite the couples in quantity rather than in tension. It is found that the chemical action is great. The cracks cannot be replaced by porous diaphragms such as those in general use, for the reason that the latter are not sufficiently capillary.

In a future memoir I shall enter into details as to the means of augmenting the energy of electro-capillary piles.

PROPAGATION OF THE INSTANTANEOUS CURRENT OF THE LEYDEN JAR.

We are all familiar with the fact that a discharge of static electricity may be so rapid and instantaneous as to be incapable of inflaming a portion of gunpowder laid in its track; while, if this extreme rapidity be toned down or retarded by the interposition of high resistance, that explosion then takes place; and it is in that way we act, if we desire to get a measureable deflection through a galvanometer of a discharge from a Leyden jar.

Professor Gaillemin, of Saint Cyr, has recently investigated this subject from a new point of view, with novel and instructive results.

Instead of a galvanometer, the Professor ingeniously employed a "test-wire" of ·004-in. diameter (smaller than our ordinary No. 40° B W G), through which the current was passed, and which thus became more or less heated or fused. The battery consisted of eight large Bunsen cells, which excited a Rhumkorff coil, giving a spark of 13-in. length, and ten or twelve sparks generally charged a Leyden battery of six large jars, with a total surface of about 40-in. square. The tension thus produced was measured by means of a calibrated electroscope. The smallest interruption of the battery circuit stops all action, but this current from the Leyden battery was found to be not sensibly hindered by a layer of air of 1-100th of an inch in thickness. This current from the outer to the inner surfaces of the Leyden jars, was allowed to follow two paths. One "the test-wire," with its break of air-space capable of adjustment; the other consisted of two insulated uprights, carrying two transverse bars, which could be connected by fine parallel wires, by plates, or otherwise.

The experiments at the onset had reference to the "test-wire" circuit only; and a discharge was passed through it with complete metallic circuit, which instantly melted the wire. Another being replaced, its circuit was interrupted by an air-space, but on passing the charge, the wire was melted as in the first case. When the cut wires were terminated with metallic balls (leaving the same air-space as before) they were similarly melted, but the effect was greater when sharp points were substituted for the balls; and the air-space in this case could be considerably increased without the fusion being lessened.

Two inferences are drawn herefrom: 1st. That lightning conductors need not have a perfect continuity, and that thin layers of metallic oxide may with safety be neglected. 2d. That herein is one fundamental difference between the modes of propagation in the current of the voltaic battery and that of a Leyden jar.

With due respect to the Professor, however, it is at least doubtful whether there be any essential difference between the two currents in question, other than that of varied potential; for with 1,000 or more cells we can imitate all the tension effects of static electricity, or conversely we can tone down the impetuosity of a static discharge to give us all the ordinary properties of a voltaic circuit.

Next, as to the influence of the conductor surface: By using the two circuits he found that when the two cross-bars were united by a sheet of tin, 79 in. long and about 8 in. wide, a discharge now heated the test-wire shunt to a dark red. The tin was then folded on itself lengthwise, reducing the surface one-half. A discharge now heated the test-wire more than before. On farther folding the effect was increased, till at length the test-wire was fused. The fact became evident that in proportion as the tin plate was compacted into a solid of less surface its conductivity was diminished.

Similar results were obtained in other ways. The transverse bars being about 12 in. long and ¼ in. diameter, were connected by winding round several times from one to the other a metallic wire of about ·023 in. diameter (say No. 24^s B W G). Now, on passing a discharge the test-wire, about 3 in. long, was heated to a dark red; but on bringing the wires nearer together, and tying them with a silk cord, the test-wire was then fused. The plain inference herefrom is that currents in the same direction retard each other.

Other experiments gave additional proof of this. The transverse bars were connected by three wires A, B, and C, A and C equidistant from the middle B by a space of about 20 ins. It was also arranged that A and C contained each a piece of test-wire 3 in. long.

A discharge now heated both test-wires equally to a red heat, but on varying the postion of B it was found that when B was placed near C, then A was fused, and *vice versa*, and by the suitable variation of the apparatus the converse proposition was found to hold good, viz., that currents in opposite directions accelerate each other.

These are startling results, and opposed to all our preconceptions on the subject, but the Professor only speaks of them as applicable to the instantaneous currents of the Leyden discharge. However, it is important to observe that, however opposed to our ordinary conceptions on submarine telegraphy, yet they must apply to the inductive stage of all voltaic currents.

ON THE PROPAGATION OF HIGH TENSION ELECTRICITY.

By Count Th. Du Moncel.

The laws bearing on what is termed the "variable period" of the electric impulse are still subordinate to many conditions, some of them of a very complicated character. For this reason we find it impossible to specify or forecast them with any degree of certainty, and, consequently, it is only as they are developed by experience that we can ascertain their true significance.

One of the most curious, and perhaps also the most important of these reactions, is that which produces a change in the resistance of a conductor during the discharge of electricity of high tension through it—a phenomenon which was discovered by M. Guillemin in 1866.

It appears, in fact, from the instantaneous character of discharges of high tension electricity through a conductor, that the resistance of the latter appears to decrease as its surface increases. It would also seem that this remains true even though the section and mass of the conductor should be less than in the other case.

Considering that the laws of transmission in the permanent period are the same for static electricity and for voltaic electricity, evolved from a single cell, as proved by the experiments of M. Gaugain and others, we might well be surprised to find that the law of conductivity should be thus modified; but if we remember that, in the case of which we speak, the propagation is effected in so short a time that it is really but a very small fraction of the variable period, nothing in this phenomenon need longer continue a matter of surprise, since, with currents interrupted long before they have attained their maximum strength, the conditions of discharge are quite different from what they would have been had the interruption of the current occurred somewhat later.

This peculiar action in the propagation of the discharges, as regards electricity of high tension, in its relation to the diameter of a conductor, though very different from the ordinary cases presented, does not in reality form a single exception in itself, as may be inferred from what has been stated at the commencement of this article. The laws of the resistance of a conductor, in relation to its length, are also very different from what might be supposed, were we to consider only the laws governing the permanent period.

In 1868 M. Poggendorff demonstrated, by clear and precise experiments, that the currents from the Holtz machine, as well as those resulting from the discharge of Leyden jars, *are completely independent of the resistance* of a conductor through which they pass. Thus, whether the discharge is effected through a short metallic wire or a long wet string, the number of discharges in a given time remain always the same. The heat developed is also constant, and a galvanometer placed anywhere in the circuit continues to give exactly the same deflection.

Whether our solution is a true interpretation of the singular fact resulting from the discharge of electricity of high tension, in relation to the developed surface of the conductor, is a matter of comparatively little importance, if we are enabled to take advantage of the practical points which are placed in our reach.

In this case we have information which enables us to make an immediate application of them. From what has been said it would appear that we may advantageously employ thin metal sheets, with great breadth of surface, for the ground wires of lightning arresters, instead of the small wires now almost universally in use, since experiments show that the same mass of metal serves better for this purpose when rolled into a thin sheet than when drawn into wire of great section.

Production of Ozone by Electric Action.—*By M. A. Boillot.*—A current of dry air gave a mean of 20 to 21 milligrms. of ozone to 5 litres of air, which corresponds approximately to 1 litre of oxygen. A current of oxygen in the same conditions gave 7 milligrms. per litre. In further experiments the precaution was taken to remove any oxygen compounds by passing the air through a solution of caustic potash. The results were unaltered. Hence oxygen, in the condition in which it exists in the air, is more readily transformed into ozone in the proportion of 3 to 1 than pure oxygen gas. Another theoretical conclusion deducible from the above experiments is, that ozone cannot be a combination of oxygen with itself. The combination of several atoms of oxygen to form ozone seems to me to be a hypothesis no longer capable of being sustained.

Work is to be commenced at once on the Government Telegraph Line between Arizona City and San Diego, Cal.

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CORRESPONDENCE.

ON THE RECEPTION OF MESSAGES.

To the Editor of the Journal of the Telegraph:

Without reference to the courteous treatment, obligatory on the receiving clerk, towards the customers, a few hints or practical directions to the inexperienced might be acceptable.

If the message *properly* pass through the receiver's hands, in respect to plain and intelligible orthography and sense, with clear and definite address, it will in all probability reach its destination satisfactorily.

It is advisable to have Christian names in full, because initial capitals are variously written and read, and thereby frequently transformed in transmission.

If the receiver notices initials liable to such results, he may prevent them by placing the Morse characters underneath them. This should be done in all running-hand copy, with such letters as *a*, *o*, *u*, *v*, *m*, *w*, &c., that are liable to misreading or misconstruction of meaning.

If nothing more than the name of the party addressed is given, more address should be requested, because to many persons the idea of difficulty or delay in finding persons does not suggest itself. Especially is this the case with people living in small places. The larger offices are constantly in receipt of messages without addresses, which, had this precaution been exercised, might have been obtained.

If the receiver has reason to suppose that a message is for a colored person, he should place the word colored on it; for, in its absence, the presumption is that the message is for a white person, and a colored person is never looked for.

A careful, intelligent receiver will read the message to the person presenting it (in such a tone, however, that other persons will not overhear), and he will correct any trifling errors of orthography (and, I would like to say, of grammar) that would mar the appearance of the message, or weaken confidence in its contents. He would, though, be careful not to interfere with *technical* terms or quotations.

The destination of messages is sometimes seriously interfered with through inadvertence, carelessness, or the want of intelligence on the part of both customer and clerk. Many a hamlet may have its telegraph office without its name being on the record.

As a general rule, it may be laid down that if the place be not on a line of railway that there is no telegraph office there.

If on a railway, the name of the railway will generally determine the location, route, tariff, &c.; and the statement that the message can be sent to the nearest office, and thence by train, will generally secure the message for the Company. In several of the railway guides the names of all railway stations are now put in a place by themselves, arranged alphabetically. If the clerk is in doubt about the tariff he can fully protect himself in a charge of five or ten cents above the known rate of an office near by. This, under the circumstances, could not be considered irregular or unreasonable.

For the better transaction of the business, and to save annoyance to the inexperienced, the Company's blank should have a few simple directions on them, such as the following:

"Write plainly; use no figures; give full address and date."

They should also have specified places on them, for the numbering and the timing of both receivers and operators. Perfection in the business is only to be reached through careful attention given to all these little, numerous, yet essential, details.

Information asked for in such questions as, "Did Mr. —— send a dispatch to, etc.?" should not be given. Serious injury might ensue through thoughtlessness or innocence in replying. The Company has no property or interest in the contents of a message further than is necessary to its proper transmission. Its agents are but intelligent machines.

W. W. KELCHNER.

Springfield, Ill.. May, 1873.

To the Editor of the Journal of the Telegraph:

Since the beginning of the discussion of the advisability of the adoption of the European alphabet, I have been struck with the unanimity of opposition thereto as evinced through your columns of correspondence. Enough has been said to show that operators, chief operators, managers and superintendents are almost a unit against the change. But let me ask every one of them a question or two.

Suppose you, an opposer—INDIVIDUALLY YOU—owned the controlling interest in the shares of the Company, and that you had become convinced it would add to reliability and accuracy, and that certainly no loss would entail, and perhaps a profit accrue through the adoption of the new alphabet—would you, or would you not, cause its adoption whether the employés were for or against?

While the privilege to discuss the question has been thrown open to five thousand employés, it cannot be denied that but a very small percentage of them are at all able to throw any light upon the subject; yet, as they may speak as with one voice *in opposition*, they may succeed in causing the rejection of that which, in calm deliberation, has been decided upon for the best good of those most deeply interested, without doing injustice to any one. The same case occurs in elections: the best man may be, and frequently is, unanimously rejected.

The fallacy as to the case politically is shown in that, while every one may vote, only a few are taken to counsel.

Had the Company convened fifty or a hundred from among the most intelligent and talented of its superintendents, managers, chiefs and operators, for the purpose of deliberating, and deciding from the results of such deliberation, the course as to what were best to do would have had sufficient light thrown upon it to admit of no doubt in the mind of those who alone have a right to decide. The fallacy of the course taken by the Company will be shown in this: should it now or hereafter decide to adopt the change, it will have to do so in the face of the open and expressed opposition of nearly every employé concerned. This would be a seemingly ungracious act, and for the Company a very unpleasant one, to perform.

Should it, however, retain the old alphabet solely on account of the opposition developed, the aspect, it must be acknowledged, will resemble that of a successful strike—successful, not because of the strength or justice of the employés or their cause, but successful because of the indiscretion on the part of the Company.

The employés would lose nothing by the change, either in time or money, and not more in labor and perplexity than in changing from railroad operating to commercial business, or from commercial business ordinary to arbitrary cypher—like "ycx, oicrm, xultye"—which latter kind is much used in great variety.

The ease with which each man will make the change will be according to his talent as an operator; and, as the amount of service which each is expected to perform is usually according to his ability to perform it, the task will fall quite equally—that is, it will be as easy for one as for another.

For my part, I count it no task at all. Though I have manipulated Morse for eighteen years, I have learned, in a few minutes, every new alphabet which has come out—that is, learned each thoroughly enough to make a start without danger of error or much hesitation.

The inconvenience or perplexity (almost altogether imaginary) is the only ground upon which an operator can base his opposition. He can make his work as surely correct as he pleases, and has authority from the President of the Company to do so, as shown in the Book of Rules. He is not responsible for the delay which may ensue to business on account of the change, if he has done his best to master the difficulty. The general result will show in what spirit each has worked, by comparison with others of his class of talent. The most unsuccessful will be successful enough, and the most stubborn will be tractable enough, to successfully make the change from the very start.

But first convene your talent and intelligence; deliberate with all deliberation; lay the verdict before the stockholders, and let the judgment be a fair and square Yes or No.

To do less, in so momentous a matter, would not be well. The decision will be accepted in the spirit it is given; therefore, let it be hearty and without a misgiving.

X. Y. Z.

NEW YORK, 19th May, 1873.

To the Editor of the Journal of the Telegraph:

Having held the position of operator in the British Postal Telegraph Service for some time, and having recently arrived in America, I wish to say a few words regarding the proposed change of Code.

Judging from the operators' letters on this subject in the JOURNAL, one would naturally imagine that they were consulting their own individual comfort, or *dis*comfort, in the matter, rather than that of the public. Most operators, no doubt, would prefer to work the Morse code, but if the Continental is a better safeguard against mistakes I think it is due to the public to use it. Telegraphy is becoming a necessity to merchants and business men, and there is no doubt, that for its proper growth and development, "bulls" are not at all essential. That it is not difficult to make "bulls" with the present Morse code is well known. I refer, of course, to the spaced letters.

To adopt the European system would, however, cause a great deal of confusion in the ranks. I would not consider this plan judicious, nor indeed necessary. The Continental, like the Morse, has some faults. The figures, for instance, are something terrible compared with the Morse. But it is quite clear to every right-minded operator that the spaced letters in the Morse code are daily causing mistakes, and the only remedy we have is to discard them entirely.

There is another thing I would say a word upon. When initial letters occur in a message, they are crowded on each other so fast that the operator is uncertain whether they are one word or single letters; and, should it be such as W. M., they are copied Wm. On the other hand, if a word is written slowly, it is divided into two or three initial letters, and, to complete the transformation, the remainder of it is joined to the next word; take for instance the case we heard of the other day, in which "Dry Goods Bank" was converted into "Dr. Y. Goodsbank;" or, again, "Wheeler, Fort & Co." was made to read "W. H. Olerfort & Co." With the Continental style this would never happen, because they write a full stop after each initial letter. The American ·-·-·-· is too long for this purpose, but let us take

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the Continental -- -- -- instead, and follow strictly the rule of dividing initial letters, whether in address, body or signature, by this period, and I have no doubt that mistakes of this nature will be of seldom occurrence compared with the present.

I hope this will be commented on by operators interested in the matter. W. J. J.

DES MOINES, Iowa, May 17, 1873.

To the Editor of the Journal of the Telegraph:

Having read with great interest the communications on the alphabet change question, both for and against, I would say I fully concur with the great bulk (who, I am sure, have the best side of the argument), who believe the alphabet as it is can not be improved upon. The letter "Z" might be altered to advantage, but my idea is that good manipulation will fix the balance. The system that students are and have been taught by is bad; they pick their own way, and form an objectionable habit of making their letters badly, which sticks to them during life, and receivers pay for the "bulls" made; whereas if the sending had been good square "Morse," not one-tenth of such cases would occur. Some correspondents, whose patriotism over-balances their judgment, would not adopt the International alphabet even if they knew it was better. This is all wrong, and is worse than a poor argument. Another improvement, I am satisfied, could be made. Let the Executive Department issue an order that all checks shall be sent twice; thus: 10 paid paid, or 10 collect collect, as the case may be. I am satisfied that this simple rule would make a great change in the number of changed checks, which give all concerned a vast amount of trouble. G.

WAMEGO, Kansas, May 16, 1873.

To the Editor of the Journal of the Telegraph:

I will begin by saying that the Morse alphabet does not, in my opinion, stand greatly in need of change: certainly few American operators would willingly part with it for the horrible affair known as the Continental alphabet. Spaced letters are the one bad feature of ours—a source of annoyance to both sender and receiver. A good deal of guessing has to be done in cases where several of them come together, and guessing is certainly a risky business and an enemy to correctness. I have thought of two changes which might be made: doing away with the worst spaced letters we have—as follows: Let "c" be thus ——. , long dash followed by dot; the reverse for "r," thus . ——; the other letters and the numerals remaining the same. My observation, during nine years' practice, has convinced me that the letters above mentioned are the only ones needing to be changed; take them out and most errors would, I think, disappear. The distinction between "c" and "n" could be as easily and safely rendered as that between "l" and "t;" the same in the case of "r" and "a."

The beauty of our Morse alphabet consists in its brief and simple combinations. The changes I have indicated are easy, and can be readily acquired by the poorest operators. ALBERT FOLLATT.

To the Editor of the Journal of the Telegraph:

I am not in favor of adopting the International alphabet, but am in favor of changing the spaced letters and the letter "l," and making them as short as possible. As you wisely and justly say the system will be changed only for good and sufficient cause, I have no doubt that it will not be done without due consideration. BOUQUET.

To the Editor of the Journal of the Telegraph:

I am using one device, which I would like you to give to my fellow operators, for if it be tried on any telegraph line the advantage of it will be proven. By use of a switch, and proper connecting wires, I introduce into each main circuit the local battery used for the sounder, worked by the relay of that circuit (the + and — poles in the proper direction), making the usual connections with the local battery for working the sounder. The effect is, that by the use of the local battery in the main circuit, so near the relay, my relays work very strong in bad weather, because of the increased circuit applied just at the right time and in the right place. Of course the local battery acts upon the relay with its entire electro motive force, until the armature lever completes the local connection, when its current immediately takes the short route, and the sounder works with full force. No operator can detect any loss of power in the local sounder without the use of a galvanometer. In this manner we get a double use of our local batteries, for it is obvious that their current is not used in short circuit until the relay completes the local connections, and then there is no use for it in the main circuit until the main circuit is again broken; for the main battery keeps the relay closed until main circuit is again broken. We know that the power of every electro-magnet multiplies very fast as the armature approaches the cores; and for this reason, applying the local battery to the relay, in main circuit, until the local connection is completed, is just what is needed, and what makes the relays work to perfection. Let this simple device be applied to a wire 100 miles long, using 10 relays, and we add 20 local cells to the main line, which will prove the truth of the arrangement.

Lines using the Callaud main and local batteries will work beyond all expectation of operators who have never tried the experiment. I only ask you to try it and become convinced.

If you wish to add ½ to the power of your local cells of the Daniell's battery, procure a strip of dry wood, 1 inch wide, ¼ inch thick and 3 inches long, cut a hole through the centre of it large enough to slip on to the top of the zinc, then tighten your clamp-screw just far enough down to let the zinc hang suspended from the piece of wood in the porous cup, not touching it at any point. This entirely prevents all cross currents or local action in the cell, as it also prevents formation of copper upon the porous cups. Why can we not produce a shock from a galvanic battery unless the current first passes through an intensity magnet? It is a fact that we cannot. H. C. B.

Answer.—The arrangement you propose would no doubt have the effect of strengthening the main line current. We consider it preferable, however, to have a sufficient main battery power, and confine the locals to their proper functions. With ten offices arranged as you suggest, the strength of the main current would be constantly liable to variation, from the addition or withdrawal of 18 or 20 cups from the line.

You are mistaken in saying that a shock cannot be produced from a galvanic battery without passing the current through an intensity magnet. Very powerful shocks may be so produced, but with a given battery the intensity of the shocks may be increased by inserting an electro-magnet in the circuit. This result is due to the phenomena of induction. When an electric circuit is broken or closed, an induced current of much greater intensity than the primary current is momentarily established. This induced current is always present, but is much more marked when the primary current is caused to pass through the coils of an electro-magnet.

To the Editor of the Journal of the Telegraph:

Please explain why a local sounder put in a metallic circuit with a relay will not work, and why the relay will work and the sounder not be moved by the same current. If I take out the relay, and put another local sounder in its place, then the silent sounder begins to talk, and both sounders work all right. PATRICK.

Answer.—Other conditions being the same, the strength of an electro-magnet is in proportion to the number of turns of wire upon the spools. The coils of the relay being composed of a great many turns of wire, while those of the sounder are of comparatively few, the relay is affected more powerfully than the sounder when both are in the same circuit. With a second sounder in place of the relay, the total resistance of the circuit is greatly reduced, and the current becomes sufficiently strong to work the sounder before silent.

G. W. Howe.—With slight modifications, Stearns' Duplex would operate lines worked by Bright's Acoustic System, which uses both positive and negative currents.

L. E. Clark.—Four cells of carbon battery of the ordinary size are sufficient to work two sounders on a wire one-third of a mile in length, provided the sounders are properly constructed, and the wire has sufficient conducting capacity. In the case you present, the difficulty probably arises from the too great resistance of your iron wire, which you say is second-hand and old. If this resistance does not exceed six ohms, you should, with two sounders of three ohms resistance each, easily work with four cups of carbon.

Talladega.—There are thirteen words in the following:

"Send mail. Am much improved in health. How are all?

C. P.
Imperial Hotel. Answer."

Hernandez.—We cannot publish anonymous communications requesting the address of missing persons.

K. H. N.—If you are unable to send off a half-rate message during the time allowed for the transmission of such business, it should be sent at the earliest moment possible thereafter.

J. J. Smith.—Members of the Telegraphers' Insurance Association are notified of assessments by mail and through the JOURNAL.

W. H. W.—When application is made for a copy of a message which has been left with the Company for transmisson, it can be allowed under the provision of Rule 93, which states that "when the sender or receiver of a message applies in person, he will, if known or properly identified, be permitted to see or make a copy of his dispatch for himself." Read Rule 92 in this connection.

G. H.—Constant practice in receiving by sound, and legibly copying what you receive, is the only way of perfecting yourself as a sound operator. This practice you may obtain anywhere—in a commercial office, railway office, or in any place where you can hear the tick of an instrument. There is no royal road to learning telegraphy or any other art. Every man must travel the same path.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
June 1, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Jonesboro, Ga., re-opened.

Wesley City, Ill., closed.

Orford, Iowa, changed to Montour.

Messages may be taken for Wakefield, Mass., to be delivered from Reading, Mass. Charges for delivery, fifty cents.

Davison, Mich., re-opened.

Keytesville, Mo., closed.

Evans, N. Y., changed to Derby, N. Y.

Penn Yan, N. Y., is now a W. U. office, square 83. Check direct.

Lake Mahopac, N. Y., re-opened.

Trexlertown, Pa., is now a W. U. Office, square 66; check direct.

The P. O. A. of Hazardville, Pa., is Parryville, Pa.

Hereafter the "Tariff for Other Lines" from Sherman, Texas, to Bonham, Texas, will be 50 and 3, and to Paris, Texas, 6 and 4.

Clarendon Springs, Vt., re-opened.

NEW OFFICES.

286 Lowndesboro, Ala.
287 Tallasse, "
281 Newport, Ark.
* Bismark, Dac., 200 13 307 Chicago, Ill.
67 Southwood, Del.
376 Centre Point, Iowa.
407 Montour, Iowa.
223 Ewings, Ky.
269 Hart, Mich.
269 Mears, Mich.; check Hart, Mich.
332 Brookville, Miss.
322 Shannon, Miss.
120 Derby, N. Y.
83 Dundee, N. Y.
102 Sinnemahoning, Pa.
470 Tyler, Texas.

* Honey Grove, Texas,	75	5	470	Marshall, Texas.	
	50	3	510	Sherman,	"
* Keswick, Va.,	50	3	96	Richmond, Va.	
* End of Track, Wis.,	100	7	307	Chicago, Ill.	
* Marshfield, "	75	5	307	"	"
* Medina, "	60	4	307	"	"
* Mill Creek, "	75	5	307	"	"
* Stevens' Point, "	75	5	307	"	"
* Wapaca, "	75	5	307	"	"
* Weyawega, "	60	4	307	"	"

Penn Haven Junction, Pa., the new office opened in last JOURNAL, should read Penn Haven, Pa.

ATLANTIC CABLE BUSINESS.

Tariff of Rates, Payable in Gold, to all Points in Great Britain Ireland and France, to take effect on and after June 1st, 1873.

NOTE.—The 10 word minimum on business to or from Great Britain and Ireland is abolished.

	To Great Britain & Ireland	*To France.*	
	For each word.	*For ten words or less.*	*For each word over 10*
From New York City, and all points in Nova Scotia, New Brunswick and New England States	$1.00	$10.00	$1.00
From all points in New York (except New York City), New Jersey, Pennsylvania, Delaware, Maryland and District of Columbia	1.03	10.30	1.03
From all points in Virginia, West Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, Tennessee, Kentucky, Ohio, Indiana, Illinois, Michigan and Wisconsin, from St. Louis, Mo., and from Western Union Company's offices in Florida	1.15	11.50	1.15
From all points in Texas, Arkansas, Missouri (except St. Louis), Kansas, Nebraska, Iowa, Minnesota, Colorado, Dacotah, Wyoming, New Mexico, Utah, Idaho, Montana, Nevada, California, Arizona, Oregon and Washington Territory	1.20	12.00	1.20
British Columbia	1.35	13.50	1.35

NOTE.—*The rates to points beyond Great Britain, Ireland and France*, will still be computed by adding to the rate for ten words to London, *as directed in the* JOURNAL of May 1st.

We are informed that messages can now be taken for the following places in Japan, at the rates, from London, here given:

	Via Falmouth or Teheran.	*Via Siberia.*
Simouosaki Hiogo, Osaka, Yokohama, Yeddo,	$37 62	$24 25

The Japanese Government will not accept any liability, under any circumstances whatever, for messages transmitted over their lines.

Offices which have recently received a notice of the interruption of the Cable between Madras and Penang, and the consequent change in rate to Singapore and other points, are hereby notified that the Cable has been repaired, and that the old rates will be resumed.

WILLIAM ORTON,
President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, May 31, 1873.

On and after June 16th, *East Tawas, Mich.*, will be added to the list of money order offices in E. P. Wright's district.

Wabash, Ind., in J. J. S. Wilson's district, has been closed as a money order office.

On and after June 16th *Goldsboro, N. C.*, will be added to the list of money order offices in J. R. Dowell's district.

G. H. MUMFORD,
Vice-Prest.

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

PRAIRIE CITY, Ill., May 13th, 1873.

D. R. DOWNER, *Esq., Secretary, New York:*

DEAR SIR: I notice in JOURNAL of April 15th that the T. M. L. Ins. Association is in a very prosperous condition; that the payments to heirs of deceased members amount to over eleven hundred dollars, and the prospects are that in a few years there will be such an army of members, and the deaths so frequent, that it will make a very costly insurance—more than any operator in ordinary circumstances wishes to carry. But this can be remedied by paying to the heirs of each deceased member a certain amount only, say one thousand dollars, and still make the usual assessment of one dollar at each death, until there is a surplus in the treasury sufficient to dispense with the assessment at the next death, and so on, always keeping a sufficient amount on hand to pay one death.

Please send me blank form for application.

Yours, &c.,

A. J. CLAYTON.

The views expressed above are not new to the Insurance Committee and other friends of the Association. In fact, the plan of limiting the payments to $1,000 was proposed some two years since by Mr. Orton in his letter to Mr. Reid, published at the time, in which he stipulated to add $100 to the sum paid by the Insurance Association to the heirs of such members as might die while in the service of the W. U. Co. The plan has been thought well of, and it is desired to bring it publicly before the members, with a view of eliciting discussion and an expression of opinion in relation to the subject. It is furthermore proposed to have it formally acted upon at the next annual meeting, in November, unless it shall be deemed of sufficient importance to call a special meeting before that time, for the purpose of considering it.

Our membership is large and rapidly increasing, and while the greatest care is now exercised in admitting new members (a physician's certificate being required in cases where the applicant is unknown to the officers or to an agent, or where there is any doubt as to his physical condition), yet the death rate, according to the natural laws of mortality, must necessarily be large, causing a heavy tax on many who are illy able to bear it. Various schemes have been proposed whereby the burden might be lightened, but none seem so practicable as this. One thousand dollars is generally conceded to be as large a sum as such an Association as ours should undertake to pay at each death. While there are many who would doubtless prefer a larger sum, and who, to secure it, would cheerfully respond to the more frequent assessments which would be necessary, there is little question that the great majority would be better satisfied with the certainty of receiving a stated, though smaller amount, at a proportionately diminished cost.

It is therefore recommended, that after a certain date, to be hereinafter named, the officers shall pay not over $1,000 to the family of a deceased member and the balance paid in under any assessment to be credited to the reserve fund, to be used, whenever the Committee direct, for the purpose of liquidating claims upon the Association arising from deaths, thereby rendering unnecessary the issuing of special assessments to meet the same.

The possession of a fund of this kind would be an element of strength, and merit for the Association increased confidence. Our reserve fund, which now amounts to over $1,500, has given us a stability and a reputation which it is very desirable to maintain, and the rapid augmentation which it would receive from these additions would secure to us a proportional increase of revenue from interest, which would soon more than meet the expenses of management.

It is hoped that all who feel an interest in this matter will give us an expression of their views. Extracts of sufficient importance will be made from communications which may be received, and published for the benefit of all.

D. R. D.

ACKNOWLEDGEMENT OF ASSESSMENTS, NOS. 39, 40 AND 41, TO MAY 24.

The acknowledgment of receipt of any assessment is to be understood as an acknowledgment for all previous assessments:

15	39	90	106	134	143	171	232	288	350	360
447	490	555	573	594	597	652	711	790	782	787
799	800	801	1008	1029	1187	1274	1275	1367	1374	1375
1380	1399	1497	1515	1519	1576	1637	1638	1676	1678	1718
1779	1782	1788	1784	1788	1801	1802	1819	1853	1865	

In response to the triple assessment of April 25, there has been paid in to the credit of each call as follows:

No. 39, for the benefit of the heirs of David Blackham, $1,124
" 40, " " " H. F. Thurber.... 1,166
" 41, " " " 1,278

Jacob M. Holdman, Certificate No. 1617, died of consumption, at Searcy, Ark., on the 28th ult. He leaves a wife and infant daughter. Although Mr. Holdman's death occurred before that of J. F. Dunlap's, which was announced in JOURNAL of May 1st the notice was not received until afterward.

Another double assessment will be issued immediately, to meet these deaths.

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FOREIGN TELEGRAPHIC ITEMS

TELEGRAPH EXTENSION IN BRAZIL.

From Rio Janeiro, Brazil, under date of April 24th, we learn that "the coast cable matter has just been remodeled and a new contract signed with the Southern Submarine Telegraph Company, which bought the expiring concession, to Jones, Bright and others. The new concession relieves the Company from the obligation to touch at all the maritime provincial capitals—the obligatory ones being Rio Grande do Sul, St. Catharina, Santos, Rio, Bahia, Pernambuco, Maranham and Para. A year is allowed for soundings, etc., and the first section, from Rio to Pernambuco, is to be at work within two years, and the whole within five years. Land lines may be extended from the City of Rio Grande do Sul to the Uruguayan frontier, to join the lines of the Uruguayan Republic, but provision has been made for a junction with the Rio and River Plate Cable Company, and with any others thought useful. The Southern Telegraph Company has some 1,500 miles of cable ready, which was intended for a cable between Europe and the United States, but the present intent is to use it for the Brazilian coast line if the soundings do not forbid its use. The agents of the Telegraph Construction and Maintenance Company and the Southern Submarine Telegraph Company are returning to Europe, having completed their arrangements here.

CIRCULAR OF THE FRENCH CABLE COMPANY.

The following circular has been issued by the French Cable Company in reference to the amalgamation of the companies:

"The Anglo-American Company will increase its capital to 7,000,000*l.*, and purchase the French and Newfoundland Companies; in this total capital 3,451,550*l.* will represent the capital of the French Company (now 1,650,000*l.*); 2,548,450*l.* will represent the capital of the Anglo-American Company (now 1,675,000*l.*); 1,000,000*l.* will represent the capital of the Newfoundland Company (now 864,520*l.*); total, 7,000,000*l.* This company's new cable will now be laid from Valentia to Heart's Content, Newfoundland, and from Placentia to Sydney (Cape Breton), in place of from Land's End to Halifax and New York. The shareholders in this company will receive for each present share of 20*l.* about 41*l.* 15s. in the shares of the amalgamated company, subject to the payment by this company of its existing debenture debt and the expenses of the liquidation, which may be estimated in round figures at 5*l.* per share. As, however, the saving in cable, &c., made by the change of route, will be considerable, two-thirds of which saving will accrue to the amalgamated company and one-third to this company, it is expected a portion of this 5*l.* will be provided for. The Newfoundland Company reserves its own land rights, and of the 1,000,000*l.* accruing to it in the amalgamated company, 135,480*l.* will be placed in trust, to be handed over to the Newfoundland Company at the expiration of two years, should none of its present exclusive rights and privileges be withdrawn; otherwise said 135,480*l.* will revert to the amalgamated company. The shareholders will be summoned together with the least possible delay."

A DESPATCH dated London, May 28, states that a bill has been filed in Chancery against the Anglo-American Cable Company to prevent the amalgamation of its stock with that of the Newfoundland and the French Atlantic Telegraph Companies.

CHINESE INTEREST IN TELEGRAPHY.—The Great Northern Telegraph Company have been erecting in Amoy a short telegraphic line between their offices and the American Consulate. Their idea was to give the Chinese authorities a practical illustration of the working and value of the telegraphic system, and at the same time pave the way for its fuller introduction into the country. They accordingly, when the line was completed, invited the Mandarins to visit their establishment, and see for themselves the way in which messages were transmitted, etc. None of them, however, would attend, and the end has been that the whole thing has been pulled down.

THE traffic receipts of the Great Northern Telegraph for the month of March amounted to 242,769 fr. (£9,711), against 198,884 fr. (£7,958) for the corresponding month of last year.

THE Austrian Minister of Trade has given notice of his intention very shortly to adopt the system of adhesive stamps for the pre-payment of telegrams, and at the same time to reduce the charge for messages, from one station in the Austro-Hungarian Monarchy to another, to one uniform rate of fifty kreutzers.

THE total number of telegraph messages forwarded from postal telegraph stations in the United Kingdom for the week ended April 19, 1873, was 311,323—an increase on the corresponding week of the previous year of 35,974.

THE telegraph cable between Martinique and Dominica was repaired, and resumed operations March 20th.

THE declared value of telegraphic wire, and apparatus connected therewith, exported from Great Britain for the three months ending March 31st, was £106,227, against £29,859 in the corresponding period of the previous year.

A STATEMENT has been published showing the average receipts per day of the Atlantic Telegraph Company. In 1866, they average £747 per day; in 1867, £897; in 1868, £936; in 1869, £906; in 1870, £1,278; in 1871, £1,650; in 1872, £1,885 per day. It will be seen, therefore, that with increased facilities and reduced tariffs, the business of the Companies has largely increased. Last year the Companies must have forwarded 9,425 words per day.

THE report of the Brazilian Submarine Telegraph Company states that the order for the cable has been given to the Telegraph Construction and Maintenance Company, and that, up to the date of the report (April 25), 469 miles, according to the certificates of the Company's engineers, have been manufactured. Satisfactory working arrangements have been entered into with the Eastern Telegraph Company for the transmission of the Company's messages to Great Britain and the East, and similar arrangements are in course of completion, with the Great Western Telegraph Company, for the transmission of their messages, subject to that Company establishing a complete system of telegraphic lines along the coast of Brazil.

THE *Auckland* (New Zealand) *Cross* says:—The successful progress of the telegraph department in New Zealand is a proof how a public want once supplied grows into use. Many will remember that some people condemned the telegraph as a luxury with which New Zealand could easily dispense. A few years have passed, and it has become a necessity, just as our railways are doing where in working order, so that people now wonder how we could have so long existed without them.

MR. J. C. FLEMING has been appointed Superintendent of Telegraphs for Western Australia, and the Government has fixed the telegraphic tariff at one shilling per ten words between any two stations throughout the colony.

THE Peruvian Congress has agreed to authorize a guarantee of five per cent. on a capital of half a million soles, for the construction of a sub-marine telegraph between Payta and Panama.

THE telegraph line to Lota, Chili, was to be completed on the 1st of May.

AN AIR BATTERY.

Drs. J. H. Gladstone, F. R. S., and Alfred Tribe recently read before the Royal Society a paper on a new air galvanic battery, constructed on the principle that if pieces of copper and silver in contact are immersed in a solution of nitrate of copper in the presence of oxygen, a decomposition of the salt ensues, with the formation of cuprous oxide on the silver and a corresponding solution of the copper, while a galvanic current passes through the liquid from copper to silver. To employ the oxygen of the atmosphere and facilitate its contact with the silver and dissolved salt, the silver plate is placed in a horizontal position just under the surface of the liquid, with the copper plate beneath it, connection being established by a wire as usual. Holes are made in the silver tray to shorten the communication between the air surface and the copper plate, and to facilitate the movements of the salt in solution.

The conclusions determined are briefly as follows: The current gradually diminishes on account of the rising up of the dissolved oxygen in the neighborhood of the silver, but is augmented by merely moving the liquid so as to bring fresh parts of the solution against that metal. A similar result is gained by stirring the silver crystals so as to expose new surfaces. If the wire be disconnected for a time, so as to allow the oxygen to diffuse itself from other parts of the solution, and if the connection be again made, the current is found as strong, or nearly so, as before. Oxygen is taken up with the greatest avidity, the solution absorbing even minute quantities from the surrounding gas. Six per cent was found to be the best strength of the copper nitrate solution. As regards the best proportion between the areas of the metallic surfaces, the increase of the copper has little effect, while that of the silver, the negative metal, causes an almost proportionate increase in the chemical action. Heat increases the action of the cell greatly, the augmentation being more rapid in the higher than in the lower ranges of temperature, from 68° 122° F. The internal resistance of the battery is small. As to the electrolytic power of the current, six cells were sufficient to decompose dilute sulphuric acid slowly, and dilute hydrochloric acid pretty quickly, copper electrodes being employed.

The theoretical interest of this battery lies mainly in the fact that it differs essentially from every other galvanic arrangement, inasmuch as the binary compound in solution is incapable of being decomposed either by the positive metal alone or by the two metals in conjunction; it cannot serve, in fact, as the liquid element of the circuit without the presence of another body ready to combine with one of its constituents when set free. The practical interest centers in the fact that the device is an approximation to a constant air battery. By employing chloride of zinc, power may be obtained at a minimum of expense. Such a battery would appear to be specially adapted to cases where the galvanic current has to be frequently broken, as in telegraphy; for, at each period of rest, it renews its strength by the absorption or diffusion of more oxygen from the air.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, JUNE 2, 1873.

DUE CREDIT.

It has come to our knowledge that the article in the last issue of the JOURNAL, relating to the efficiency of the Western Union Company's lines and service, has conveyed an impression which was not intended. It was mainly designed to indicate the valuable results which have followed the application of accurate scientific knowledge to the various departments of the Company's business, and especially in perfecting machinery and instruments, the arrangement of batteries, and in increasing the efficiency of the lines. It was not intended to give credit for the exhibition of greater zeal, energy and efficiency by those connected with one branch of the service, than by those connected with other and equally important branches. The work of constructing and maintaining the lines is now, as it has been heretofore, under the charge of District Superintendents, subject to the immediate supervision of the General Superintendent, in each Division, who is held responsible for their condition.

Especial credit is due to these officers in all the Divisions for the manner in which their work has been performed during the past few years. Much credit also belongs to the Managers of principal offices, some of whom have become skillful electricians, and also to district foremen of construction and repairs, for the excellent results which have been steadily developing, rendering the Western Union lines, and the work performed thereby, as efficient, prompt and reliable as any in the world. The operators are also deserving of mention in this connection. They are doing more and better work than ever before, and give gratifying evidence that the JOURNAL is accomplishing, steadily and surely, the objects for which it was established.

SUPERINTENDENTS frequently have occasion, in the performance of their duties, to instruct subordinates as to the provisions of Executive Order No. 125. To save the labor of copying it by pen, we re-produce it. In future, reference to this number of the JOURNAL will answer the desired end.

PREVENTION OF UNNECESSARY OFFICE MESSAGES.

In December, 1869, the following circular was sent to all offices in the Pacific Division by Mr. Geo. H. Mumford, then the General Agent of the Company in that territory. The provisions of the circular are still in force there, and are found to be of much advantage in the prevention of unnecessary service messages. Working so well, they might, with good result, be put into operation in the other divisions, and, while not desiring to make an order to effect this, the officers of the Company are favorably inclined to the course indicated:

"The mass of unnecessary 'office correspondence' by telegraph is a great and constantly increasing evil. The wires are loaded down; a greater force is necessary, and commercial business is delayed. The evil was glaring when our tariffs were two or three times higher, but since the heavy and universal reductions lately made it has become intolerable. It is impossible to maintain these low rates, if, as in some instances lately, four or five messages are to be sent in regard to a single 25 cent message, which has been duly and promptly delivered.

"All correspondence with officers of the Company and its various departments, or with other officers relative to checks, etc., should be *by letter*, and *never by telegraph*, except for matters too urgent to bear the delay of mails.

"Where a message calls for an answer, it is the duty of the delivery office to make every exertion to obtain a reply immediately. This duty is almost always complied with, and the presumption in each case is that it has been done. Where prompt answers are not obtained, it proves, in nine cases out of ten, to be the fault of the party to whom the message is addressed, and it is not proper that we should thereby be subjected to the expense of office correspondence; therefore, when the lines are in their usual good working order to the places where messages are addressed, and the senders desire any information relative to delivery or answers, they are to be charged ordinary rates for office messages. It is desirable that the customers should send the messages of inquiry in their own names, either to their correspondents or to our agents. If it is ascertained that the Company has been in fault, the entire tariff paid for the original message and subsequent correspondence relative thereto will be refunded; *provided*, however, that the Company is not to be considered as in fault if the parties to whom messages are addressed cannot be found.

"The object of these rules is to cut off unnecessary telegraphing, for the benefit of the public, and to increase the efficiency of the service.

"Every needless inquiry upon the part of one customer delays the business of somebody else."

REDUCTION OF ATLANTIC CABLE RATES.

Following the repair of the French Cable, the rate from New York City to any point in Great Britain and Ireland is reduced to one dollar per word, and to France ten dollars for ten words. The rates now are the same that existed prior to May 1, 1873, but the rates to points beyond Great Britain and France, which have heretofore been computed by adding to the rate to France, will hereafter be found by adding the same amounts to the rate for ten words to London.

OBSERVE THE RULES.

Were the regulations which govern the service of the Company more generally observed and carried out, particularly those concerning messages which require answers, much unnecessary labor, and some little annoyance, both to customer and employé, would be saved. Rule 13, one of the most important, seems to be regarded as almost a dead letter. Were it properly observed, the revenue of the Company would be materially increased, while the labor of operators and clerks would be greatly lessened. It is not just that whenever a person fails to return an answer to a message which he has received, the Company should, without charge, be at the trouble and expense of again sending to the negligent receiver, besides transmitting two office messages, each one costing them as much to transmit as the original message. The obligation of the telegraph company ceases when it has delivered a message. Procuring an answer is in no sense part of the contract, and it is only in a spirit of accommodation to its customers that the endeavor is made. Extra service in this direction should be charged for, and the rule provides for this in the cheapest and most satisfactory manner.

Rule 13 reads:

"Whenever a person sending a message desires to know that his correspondent has received it, such information may be furnished to him from the manager of the office to which the message is transmitted at one-half the usual rates. In such cases the signal "34" will be sent with the message, signifying that the sender wishes a reply from the manager of the office at the place of its destination, stating whether the message has been delivered to his correspondent or not."

THE NEW TARIFF OF RATES.

The new Tariff of Rates, which is to go into effect July first, is now about ready for distribution.

The change contemplated by the new rates is a general reduction and simplification of the tariffs.

Under the present system each Division has a separate scale of rates for its own offices. Besides these, there are three others applied in ascertaining rates between Divisions; the arbitrary local rates between offices of one Division and those of another; and such old rates, in use previous to October, 1869, as were retained by special orders. The present special rates will be changed only by the substitution of the new scale rates whenever the latter are found to be the lower.

In order to harmonize, as far as possible, these different and often conflicting scales and rates, and at the same time work a general reduction in the tariff, it was decided to adopt the scale now about to be put into operation.

With one exception (a single rate in the Eastern Division), no increase will be made by the new rates. The adoption, therefore, of a scale which will secure uniformity, must accomplish a great and general reduction, as will be seen from a comparison of the rates now in use with those proposed:

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LOCAL RATES.

	25 *miles.*	50 *miles.*	75 *miles.*
Eastern Division, North and East of New York State...	25c.	30c.	35c.
Eastern Division, South and West of New York, and Central Division.....	35c.	45c.	55c.
Southern Division.....	35c.	50c.	50c.
New Local Rates.....	25c.	30c.	(sqr. rate.)

The local rates, for points between 50 and 75 miles distant from any office, will be discontinued.

SQUARE RATES.

Squares	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Eastern Division	35	40	55	70	80	90	100	110	120	130	140	150								
Central Division	55	65	75	85	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250
Southern Division	50	65	75	90	100	120	135	150	165	180	200	220	240	250	250	250	250	250	250	250
New Rates	40	40	50	50	75	75	75	75	100	100	100	100	125	125	125	125	150	150	150	150

Each square represents a distance of fifty miles.

At present there is a rate for nearly every multiple of five between twenty-five and two-fifty. Under the new scale there are but ten different rates, and all but the 30c. local rate, and the first square rate, 40c., are multiples of 25.

A sufficient reason for the increase of the 35c. rate in the Eastern Divisions will be found in the greater uniformity thereby attained.

Some slight departure from the new scale is made in the rates of points in the Central Division west of the Missouri River, but in every case there is, nevertheless, a considerable reduction.

SERVICE CORRESPONDENCE BETWEEN OFFICES.

The postal cards seem to be well adapted for error sheets and for almost every other kind of correspondence between offices. Managers should take advantage of this convenience in all cases where the service will not suffer by the delay. In this way the wires can be materially lightened of their burden of office messages.

IMPROVEMENT IN STOCK REPORTING INSTRUMENTS.

The Gold and Stock Telegraph Company have, by improving the form of their instruments, practically doubled their speed of transmission. One circuit, working a dozen of the improved instruments, is now in operation from the headquarters of the Company, No. 61 Broadway, and has proved so successful, that as rapidly as instruments can be changed from the old form to the new, they will be substituted for those now generally used.

CUTTING THE TELEGRAPH WIRES.—One night last week some one cut the telegraph wire between Hoboken and Union Hill, N.J., stretching the wire across the horse-car tracks, about six feet from the ground. One of the car drivers was caught by the wire, and would probably have been killed had the car been moving as rapidly as was customary at the spot where the trap had been laid.

E. S. FERRERO, one of the cable receivers at 145 Broadway, New York, died May 24. He joined the Insurance Association in January, 1872, but dropped out after having paid nine assessments. Consequently, his family will receive no benefit from his connection with the Association. Mr. FERRERO was an accomplished linguist, being able to converse fluently in six different languages. He became connected with the French Cable when the line first opened for business, and upon the consolidation of the cable companies was retained in the service, in which his linguistic abilities were frequently of great usefulness.

A SAN BERNARDINO, California, correspondent of the *San Diego Daily Union*, states that Mr. James Gamble, Superintendent Western Union Telegraph, visited that place the other day, with reference to an extension of the telegraph from Anaheim to San Bernardino. At a meeting of the citizens a proposition to raise $2,500 in aid of the line was in favor, and a committee appointed to solicit subscriptions had already obtained $1,500.

DURING a fight in the streets of the City of Panama, which occurred in the last revolution in the State of that name, and which has just been brought to a close, the telegraph office was perforated by ten bullets. One struck the wall immediately over the head of the operator, and at the same moment another smashed his local battery.

THE Gold and Stock Telegraph Company, of this city, declared a dividend of three per cent. on the 22d of April.

THE French Atlantic Cable, which was broken 208 miles from Brest, has been repaired.

EXECUTIVE ORDER No. 125.

On and after the first day of July, 1871, all messages relating to the affairs or business of the United States, except the weather reports and those relating thereto, offered for transmission by any of its civil or military officers or agents, will be received without pre-payment being exacted, and will be forwarded promptly, priority being given them over all other business. The tariff on such messages will be computed as follows: One cent per word for each two hundred and fifty miles or fractional part thereof. All words to be counted, except the date and the place where the message is filed; provided, however, that no message shall be counted as less than twenty-five words. Distances will be computed by the tables of the War Department, which tables will be furnished to all offices where Government messages are regularly filed. Until so furnished, distances can be ascertained by inquiry of the New York or Washington office. All such business will be entered as paid at the office where it originates, and the bills will be presented monthly as heretofore. In cases of inability to collect, a duplicate of the account, and the originals of messages, will be forwarded, with the monthly account current, to the auditor, credit being taken therefor as cash.

WILLIAM ORTON,
President.

QUARRELING BY TELEGRAPH.

From the Springfield Republican.

Jack Hurley, formerly a telegraph operator in this city, is in the Worcester jail for a little indiscretion, illustrating the peculiarity of his business. Jack was receiving in the Framingham office, and once or twice had to ask Worcester to repeat. Worcester did so, and volunteered the information that Framingham was a fool on whom it would be delightful to put a head. Straightway the wire from Framingham spoke, "I'm coming;" and unable to wait for a passenger train, the impetuous sender took a freight train, and presently arriving, gave Worcester a great drubbing, for which he was imprisoned as above. Now, however, from all over New England comes to Worcester the anxious inquiry, How's your head?

AN Act incorporating the New York Underground Telegraph Company has been passed by the Legislature and signed by Governor Dix.

AMONG the philosophical apparatus at Dartmouth is a battery of thirty-six cells, which was used by Franklin in his celebrated experiments. It has quite a history, having been brought to America by Dr. Priestly at the time of the Irish riots. After Franklin owned it, it fell into the hands of Dr. Prince, of Salem, and finally was obtained by the grandfather of Professor Young, who at present has it in his possession.

BORN.

HOWIE.—At Pewamo, Mich., May 15, 1873, a son to David Muir Howie, Agent and Operator.

LANGHORNE.—At Indianapolis, Ind., May 16, 1873, a daughter to A. T. Langhorne, of the W. U. Tel. Office.

MARRIED.

LEE—MATTHEWS.—At Trenton, N. J., May 7, 1873, by Rev. A. Lawrence, Edward A Lee, Operator at Hazleton, Pa., to Miss Frances P. Matthews, of Titusville, Pa.

NEW ADVERTISEMENTS.

F. L. Pope & Co. Reduction in price of Nonpareil Apparatus.

Telegraph Supply and Manufacturing Company. Telegraph Machinery.

M. A. Buell, Little Monitor Sounder and Key.

Canadian Telegraph Supply and Manufacturing Co.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY.

March, 1873.

APPOINTMENTS.

M. L. Campbell.....145 Broadway.
G. Cummings..... "
R. S. Emerson..... "
E. Hickey..... "
W. H. McEnroe..... "
C. E. Miller..... "
V. Murphy..... "
T. Peters..... "
C. T. Raymond.....Relief
C. Van Eiten..... 145 Broadway.
Miss F. M. Browne..... "
Miss A. M. Dorland..... "
Miss E. T. Hallowell..... "
Miss M. J. Mitchell..... "
Miss C. Whitehorn..... "
Miss E. T. Wilkes..... "
Miss Eva Berggrist..... "
C. Flood.....Corn Exchange.
Miss C. Truchilat.....Cooper Union.
W. McAllum..... Forty-second street.
O. E. Grody.....Thirtieth street.
J. G. Ballard..... 21 Wall
A. Penvenoff..... "
Jno. Weigh, Relief.....St. Nicholas.
Miss J. Wroger, Relief.....St. Cloud.
W. S. Libby.....Lewiston, Me.
W. A. Boothby.....Waterville, Me.
Miss L. A. Perry..... E. Killingly, Ct.
Miss F. E. Clark.....E. Thompson, Ct.
Miss H. Wilcox.....State Line, Mass.
W. F. Hawkins..... So. Framingham, Mass.
Miss A. Pendleton.....Terryville, Ct.
Miss E. H. Harrington.....Washington, R. I.
A. C. Clark.....Spencer, Mass.
Miss M. F. Brady.....Charlestown, Mass.
F. L. Ditmar.....Boston "
C. L. Weedon..... " "
Jno. Barnwell..... " "
J. C. Safford.....Middlefield, Ct.
Miss J. Carr.....Moosup, "
Miss Jennie Todd.....Northfield, "
Thos. Clary..... Oneco, "
Wm. C. Bamber.....Booneville, N. Y.
Geo. C. Morehouse.....Ithaca, "
Jno. H. Lucas.....Susp. Bridge, N. Y.
Jno. Bierhardt (Salina).....Syracuse, "
J. Kernirs..... " "
J. J. Clarke..... " "
J. P. Merrill.....Caroline, "
S. G. Dana..... Port Jervis, "
G. L. Groatinger.....Horseheads, "
H. M. Scranton..... Perry, "
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W. B. Lamar.....Winchester, Va.
Eli F. Bond.....Baltimore, Md.
F. P. Wilson..... "
B. F. Thomas..... "
Jno. Gaylor..... Bethlehem, Pa.
W. J. Brotherson.....Hoboken, N. J.
F. B. DeForest.....Albany, N. Y.
A. D. Gardner.....Brewsters, N. Y.
A. Frier.....No. Hoosick, N. Y.
D. H. Words..... Huntington, Pa.
J. H. Mchaffey..... Lock Haven, Pa.
C. Sedan..... New Brunswick, N. J.
J. A. Logan..... " "
F. H. Patrick..... Philadelphia, Pa.
E. C. Boileau..... " "
J. Christie..... " "
T. J. Stevens..... So. Bethlehem, Pa.
W. B. Upperman.....Washington, D. C.
J. A. Lyon.....Montrose, Pa.
T. A. Taylor.....Moncton, N. B.
F. H. Cleveland.....Sackville, N. B.
L. K. Whitcomb.....Chicago, Ill.
Miss L. Van Housen..... " "
J. O. Connell..... " "
Miss Alice C. Nute..... " "
A. H. Stoner..... " "
R. G. Williams..... " "
Miss M. L. Russell..... " "
E. P. Delano.....Peoria, Ill.
G. D. Field..... Chicago, Ill.
J. W. Strong..... " "
B. C. Wilkins.....Clinton, Ia.
F. W. Farley..... Kansas City, Mo.
C. E. Browne..... " "
W. E. Mangy.....Springfield, Mo.
L. K. Hutchinson..... St. Joseph, "
Ed. Evarts.....St. Louis, "
Jas. W. Cooke..... " "
Alvin Hicks..... " "
J. T. Holly.....Cheyenne, N. Y.
B. F. Woodward..... Denver. Col.
A. G. Drake.....Omaha, Neb.
W. S. French..... " "
N. H. Scott.....Beaver Creek, Col.
W. J. Gilson.....Pittsburg, Pa.
E. T. Ward..... Titusville, "
L. A. Langworthy..... " "
E. P. Warner.....Crestline, O.
H. F. Higby.....Muskegon, M.
C. W. White.....Irvineton, Pa.
W. H. Slacer..... Buffalo, N. Y.
L. DeForest..... " "
J. G. Arthur.....Cleveland, O.
Jno. McRobin.....Grand Rapids, Mich.
Jas. D. White..... " "
J. Hall.....Jackson, "
E. M. G. Kellogg.....Kalamazoo, "
Jno. W. Cadmus..... " "
Wm. M. Noble..... La Porte, Ind.
J. R. Russell.....Meadville, Pa.
Geo. H. See..... Sandusky, O.
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G. W. Smith.....Amelia, O.
O. J. Waddell.....Cincinnati, O.
J. P. McClure..... " "
C. J. Connoly, Depot.....Newark, "
W. H. Banister..... Tel. Supt. L. E. Div. B. & O. R. R.
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E. C. Smith.....Covington, Va.
Asa Davis.....Chattanooga, Tenn.
J. B. Spellden..... " "
N. C. Harris.....Fred. Hall, Va.
A. D. Saylor..... Goshen, "
E. T. Krebbs.....Greenville, Tenn.
W. H. Kimbrough.....Petersburg, Va.
J. A. Courtney.....Quantico, Va.
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J. P. Doody.....Richmond, Va.
J. McCarthy..... " "
J. P. Mann.....Staunton, "
T. L. Ennis..... " "
Jno. Farrell.....Louisville, Ky.
E. W. Gibson..... Memphis, Tenn.
Jno. Mullins..... " "
C. L. DeForest..... Nashville, Tenn.
W. T. Heard.....Barnett, Ga.
A. V. Eaves.....Bamberg, S. C.
F. A. Drake.....Charleston, S. C.
W. D. Howe.....Georgetown, Ga.
R. J. Gregg..... Marion, S. C.
W. E. Atmore.....Gilmer's, Ala.
J. R. Homady.....Jennison's, Ala.
P. Delgado.....Kingston, Ga.
M. L. Gilmer.....Montgomery, Ala.
W. L. Allen..... " "
C. G. Cox..... " "
W. K. Thurber..... Mobile, "
J. W. Hawkins.....Mumford, "
J. R. Huggins.....Waynesboro, Miss.
C. A. Franklin.....Welhite's, Ala.
F. H. French.....Plantersville, Ala.
P. W. O'Sullivan.....Boutte, La.
P. Vidal..... Kenner, La.
M. T. Kendall.....West's, Miss.
F. Whitehurst..... Charlotte Dep., N. C.
Geo. English.....El Dorado, Ark.
G. W. Sawyer.....Monroe, La.
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F. B. Goodrich..... Shreveport, La.
J. T. Hall..... " "
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F. Burnett.....Rice, "
T. G. Moffitt.....Brenham, "
C. A. Work.....Dallas, "
—— Russell.....Highland, "
D. R. Sandford.....Corsicanna, "
J. R. Hooper.....Courtney, "
J. C. Hart..... Groesbeck, "
J. H. Lee..... Houston, "
H. S. Lascombe..... " "
E. B. Vosburgh..... " "
Linton Booker.....Houston, Tex.
Jno. R. Martin..... St. Mary's, Tex.
W. D. Williams..... Liberty, "

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G. M. Eitermiller..... " "
E. A. Keene..... " "
J. Leonard..... " "
J. B. McDonald..... " "
C. Miller..... " "
A. O. Bailey..... " "
F. Dandreane.....Western Hotel, "
J. S. Collister..... Pier 28, "
Miss Minnie Hahr.....St. Cloud, "
Miss Tennie Gittings.....Astor Place, "
C. Van Bentschoten..... 21 Wall St, "
E. Reynolds.....22 Broad St, "
T. Rostick..... Fourteenth St. and Third a
Mrs. M. C. Brimmer..... Elsworth, Me.
L. J. Parry..... Kittery, Me.
Miss Alice Sweet.....E. Killingly, Ct.
O. N. Clark..... E. Thompson, Ct.
Miss B. Colson..... Pittsfield, Mass.
R. E. Rothsay.....So. Framingham, Mass.
W. J. Lombard..... Terryville, Ct.
Miss Ida Jacobs.....Washington, R. I.
J. B. Russell.....Spencer, Mass.
E. H. Corey..... Boston, "
M. J. Curtiss..... " "
Jas. Sullivan..... " "
P. Henderson..... " "
C. E. Barnes..... " "
Miss M. A. Gay..... Charlestown, Mass.
Miss Cora Gallup.....Oneco, Ct.
C. S. Beald.....Booneville, N. Y.
Geo. F. Clark.....Ithaca, "
H. Williams.....Rochester, "
Hy. Colleys.....Susp. Bridge, N. Y.
J. E. Bierhardt, (Salina)..... Syracuse, N. Y.
O. F. Webster..... " "
E. N. Robinson..... Port Jervis, N. Y.
T. B. Miller.....Frederick Junc., Md.
J. C. A. Hull..... Winchester, Va.
A. D. Gaylor.....Baltimore, Md.
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A. D. Wilt..... Centre Valley, Pa.
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Hy. Mack.....Albany, N. Y.
Jas. Buxton.....Brewsters, N. Y.
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C. Dilkes.....New Brunswick, N. J.
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O. A. Clewell.....South Bethlehem, Pa.
E. C. Boileau.....Washington, D. C.
J. Christie..... " "
D. Marean..... " "
W. H. McEnroe..... " "
E. T. Ward..... " "
Jno. J. Sellers..... Fleetwood, N. J.
Jno F. Steeves.....Moncton, N. B.
L. K. Whitcomb.....Peoria, Ill.
J. P. McClure.....Chicago, Ill.
E. M. Fox..... " "
J. H. Long..... " "
W. S. Loque..... " "
H. C. Mahoney.....Atchison, Ky.
H. G. Buckingham.....St. Joseph, Mo.
Jno. G. Edwards.....St. Louis, Mo.
Jno. M. Cardiff..... " "
A. G. Drake..... " "
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J. H. French.....Denver, Col.
H. M. Garvey..... " "
Mrs. E. A. Masters.....Idaho Spr., Col.
Ed. Sheets..... Omaha, Neb.
M. H. Peck..... Salt Lake.
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Ada Barclay.....Titusville, "
L. L. Swift..... " "
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— Whitmore.....Muskegon, M.
— Livingstone..... Irvineton, Pa.
A. T. Pierce..... Buffalo, N. Y.
E. McKenzie..... " "
C. L. Lockwood.....Gd. Rapids, Mich.
F. D. Lyon..... " "
C. S. Cheney.....Kalamazoo, "
H. H. Waller..... La Porte, Ind.
Jno. G. Matson.....Meadville, Pa.
J. U. Rust..... Sandusky, O.

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J. E. Friend	Indianapolis,	Ind.
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J. W. Chapin	"	"
R. C. Bliss	La Fayette,	"
C. N. Howlet	"	"
W. G. Whitehurst	Yellow Spring,	O.
O. K. Newton	Cincinnati,	"
E. W. Gibson	"	"
J. G. Denhollien	Columbus,	"
Jas. Lytle	Newark, O., Tel. Supt. L. E. Div. B. and O. R. R.	
R. L. Millan (Br.)	Wilmington,	N. C.
J. B. Levy	Covington,	Va.
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NEW INSULATING SUBSTANCE.

Mr. Highton communicates to the *Chemical News* the result of his experiments in search of a compound as a substitute for gutta-percha for insulating purposes. If the result of his experiments is borne out by practical tests, it certainly will have an important bearing on the future of telegraphy. The following is his letter:

"Some time ago I discovered, in the course of experiments, that vegetable tar, by the addition of the oxides of lead (or in a less degree by some other substances), is almost instantly solidified, and that the solid substance thus obtained has remarkable insulating powers.

"In some experiments at Silvertown, I found that No. 18 copper wire, covered with a coating of gutta-percha weighing only 21 lbs to the mile, had its insulation increased nearly 200,000 per cent, and that the insulation resistance increased nearly 2,800,000,000 units, an insulation sufficient for any lengths possible on the surface of the earth.

"Insulation of so great cheapness makes all further experiments on telegraphy without insulation needless, though in fresh water or by land this can be effected to very great distances.—I am, &c.,

"H. HIGHTON.

"*Putney*, April 30."

NOTE ON THE EFFECTS PRODUCED BY CURRENTS ON MERCURY IMMERSED IN DIFFERENT SOLUTIONS.

Th. du Moncel.—When the current from a battery of 8 Chutaux elements is passed through spring-water for an electrolyte—the electrode being a large drop of mercury connected with the negative pole, and a platinum wire with the positive—the polarization current, on closing the secondary circuit after five minutes action of the battery, and through a circuit of 12 kilometres of telegraph wire, has at first an intensity represented by 7 or 8 degrees on a zinc galvanometer with two spirals of wire. This current gradually disappears in three minutes. With acidulated water the effects are less. With a saturated solution of chloride of sodium (other conditions the same) the polarization current had at first an intensity of 25°, disappearing in fifteen minutes. With potash solution (salt in proportion of a fourth of weight of water) primary strength 26°; disappeared in fourteen minutes. With 3 per cent. solution of cyanide of potassium, 18° 45'; twelve minutes. With solution of chlorhydrate of ammonia, 45° to 50°; five minutes. Thus, we may form with these solutions gas couples and batteries of polarization more energetic than those which have for base oxygen and hydrogen.

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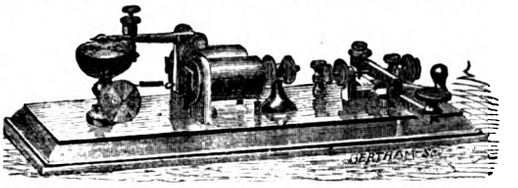
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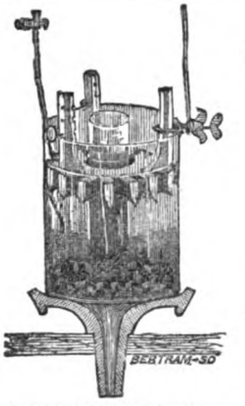
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Size of Glass, 8 x 6 inches.
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This Battery is most extensively used throughout the Country having proven the cheapest, and least trouble to maintain of any in the market.

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shown, holdin a cup of the Baltimore Battery in the above cut, which most effectually insulates the Battery as the drip passes off *thr ugh a hole in the Insulator.*

The Electrician of the Western Union Telegraph Company, Mr. PRESCOTT, says of it:—"I think your Battery Insulator a very admirably adapted for the purpose designed, and it ought to receive general adoption."

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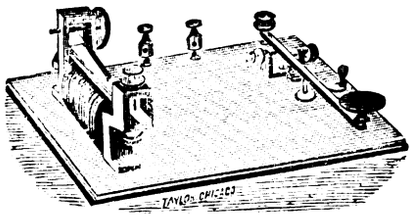
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The battery used is Hill's Patent Gravity Battery, which is considered to be the most constant and economical Telegraph Battery in use. A small size is made expressly for the above apparatus.

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ONE CUP OF BATTERY,
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This is sufficient outfit for the student; and all can be set upon a table, or the battery can be set upon a shelf near the table.

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A COMBINATION SET, comprising Sounder and Key on a handsome rosewood base.

Bradley's Box Relays and Sounders.
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 14. NEW YORK, JUNE 16, 1873. WHOLE NO. 135.

THERMO-ELECTRIC CURRENTS.

Electric currents can be produced by applying heat or cold to one of the junctions of a circuit composed of two different metals. This was first shown by Seebeck of Berlin, in 1821. It may be illustrated by employing a rectangular frame (Fig. 1), having three sides formed of a copper plate, and the fourth of a cylinder of bismuth. It must be placed in the magnetic meridian, with a magnetized needle in its interior. On heating one of the junctions with a spirit-lamp, the needle will be deflected in such a direction as to indicate the existence of a current, which, in the copper portion of the circuit, flows from the hot to the cold junction, and in the bismuth portion from the cold to the hot. If cold instead of heat be applied to one junction, the direction of the current will still be from the warmer junction through the copper to the colder junction, and from this through the bismuth to the warmer junction. Antimony, if employed instead of copper, gives a still more powerful effect.

Though a circuit composed of bismuth and antimony is specially susceptible of thermo-electric excitation, the property is possessed, in a more or less marked degree, by every circuit composed of two metals, and even by circuits composed of the same metal in different states. If, for example, a knot or a helix (as in Fig. 2), be formed in a piece of platinum wire, and heat applied at one side of it, a current will be indicated by a delicate galvanometer. In metals, which are usually heterogenous in their structure, such as bismuth, it is not uncommon to find currents produced by heating parts which appear quite uniform. If the ends of two copper wires be bent into hooks, and one of them heated, on placing them in contact, a current will be produced due to the presence of a thin film of oxide on the heated wire. With two platinum wires, no such effect is obtained.

According to Becquerel's experiments, the metals may be ranged in the following order, as regards the direction of the current produced by heating a junction of any two of them: *Bismuth, platinum, lead, tin, copper, silver, zinc, iron, antimony;* that is to say, if a junction of any two of these metals be heated, the direction of the current at the junction in question will be from that which stands first in the list to the other. His experiments have also established the important fact that the current obtained by heating all the junctions B, C, D, E, F, of a chain of dissimilar metals (Fig. 3) to the one common temperature, is the same as that obtained by uniting the two extreme bars A B, F G, directly to each other, and heating their junction to the same temperature. The more accurate statement is, that the *electro-motive force* is the same in the two cases. The *current* will be sensibly the same if the resistance in B, C, D, E, F, is insignificant in comparison with the rest of the circuit. In order that there may be a current, the circuit of course must be completed, and not left open as in Fig. 3. In the case of an open circuit, the result of the heating will simply be to produce difference of potential between the extremities A, G. This difference of potential is the measure of the electro-motive force, and will accordingly be the same in the two cases.

By employing a chain composed of wires of different metals soldered together, with its two extremities connected with a galvanometer, and heating one junction to 20° C., while the rest were kept at 0° C., Becquerel obtained currents proportional to the following numbers:

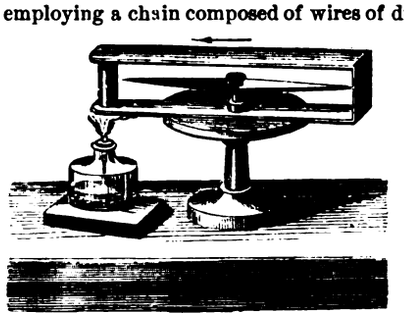


Fig. 1.

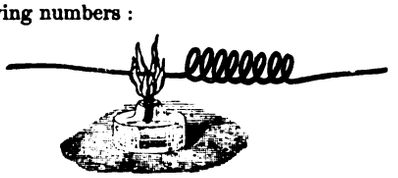


Fig. 2.

Junction heated.	*Current.*	*Junction heated.*	*Current.*
Iron—Silver	26·26	Copper—platinum	8·55
Iron—copper	27·96	Copper—tin	3·50
Iron—tin	31·24	Silver—copper	2·00
Iron—platinum	36·07	Zinc—copper	1·00

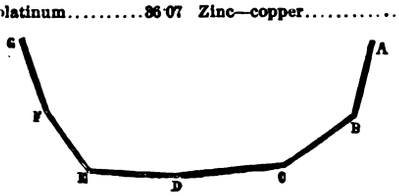


Fig. 3.

On comparing these numbers, it will be found that they are in approximate agreement with the law above stated. Thus the electro-motive force of a silver-platinum circuit comes out 10·55 by adding 2·00 to 8·55, and 9·87 by subtracting 26·20 from 36·07. The electro-motive force of copper-platinum is 8·55 as observed directly, and 8·11 as computed by taking the difference of iron-copper and iron-platinum. The deviation from precise agreement is not more than may fairly be ascribed to errors of observation.

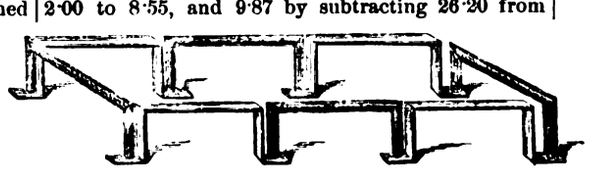


Fig. 4.

When the junctions in a thermo-electric circuit are at only two temperatures, the lower of which remains constant while the other varies, the current will be sensibly proportional to the difference of temperature only as long as this difference is small. As the difference goes on increasing, the current increases less rapidly, then decreases, and at still greater differences of temperature is reversed.

If a thermo-electric chain be composed of two metals occurring alternately (as in Fig. 4), no effect will be obtained by equally heating *two consecutive* junctions; for the current which would be generated by heating the one is in the opposite direction to that due to the heating of the other. If we number the junctions in order, we shall obtain a current in one direction by heating any junction which bears an odd number, and in the opposite direction by heating any one that bears an even number. The thermo-electric pile, or *thermo-pile*, is an arrangement of this kind, in which all the odd junctions are presented together at one end, and all the even junctions at the other, the two metals composing the pile being antimony and bismuth. The electro-motive force obtained with a given difference of temperature between the ends of the pile is proportional to the number of junctions, except in so far as accidental differences may exist between different junctions.

Thermo-electric currents may be employed either in testing equality of temperatures, or in comparing small differences of temperature. As an example of the former application, suppose a circuit to be formed of two long wires, one of iron and the other of copper, connected at both ends, and covered with gutta-percha, or some other insulator, except at the two junctions. Let one junction be lowered to the bottom of a boring, or any other inaccessible place whose temperature we wish to ascertain, and let the other junction be immersed in a vessel of water containing a thermometer. If one of the wires be carried round a galvanometer, the direction in which the needle is deflected will indicate whether the upper or lower junction is the warmer, and if we alter the temperature of the water in the vessel till the deflection is reduced to zero, we know that the two junctions are at the same temperature, which we can read off by the thermometer immersed in the water.

ELECTRICAL FIRE ARMS.

Professor Samuel Gardiner, Jr., the man who lights the Capitol at Washington by electricity, has invented a method of discharging fire arms which dispenses with gun locks and all that sort of machinery. Within the handle of the pistol or gun he has a galvanic battery, or a Leyden bottle and a rubber to produce electricity. Thence a wire extends to the cartridge, the arrangement being such that on pressing a pin with the finger, a spark of electricity enters the cartridge and fires the powder. Now, if the Professor will only make one more improvement, namely, shoot the ball by electricity without gun or powder, he will distance all competition, and add new laurels to his already distinguished fame as an electrician.

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ON THE CONDENSED EFFLUVE OF THE INDUCTION DISCHARGE.

By M. Th. Du Moncel.

The attention of chemists having lately been attracted to the effects produced by the condensed effluve of the induction discharge, I have thought it might be useful to communicate some facts connected with this physical phenomenon; the more so, that some persons seem to confound the effects in question with those from the spark itself.

The electrical phenomenon to which I have given the above name is a sort of luminous discharge produced between two plates of glass, when these plates constitute together the insulating part of a condenser, the armatures of which are connected with the poles of a Rhumkorff apparatus. Thus, let one plate of window glass be separated from another by an interval of two or three millimetres; apply to their exteriors sheets of tin, or layers of liquid connected with the poles of the induced current, and you will obtain between the two insulating surfaces the electric effluve, which appears in the dark like a luminous rain, of bluish color, and gives off ozone.

To obtain the phenomenon distinctly, the layer of air should be thoroughly dry; otherwise, the discharge, instead of furnishing a homogenous effluve, is concentrated in a small number of sparks of violet color, which have not the properties of the effluve, properly so called; one of the most important of these being, that the discharge is finely divided over a large surface, and does not produce a heating effect nor sudden mechanical and disaggregating action. In virtue of this property, one may electrize a gaseous body throughout its entire mass, avoiding the complex reactions which arise from the calorific and mechanical effects of the spark. And as the discharge takes place between two unattackable surfaces, we may obtain electro-chemical reaction without oxidations or volatilizations, or accidental absorptions capable of altering the nature of the products. By employing liquid layers as armatures, it is even possible (as M. Thenard has done) to follow by sight the effects successively produced.

At the time that I first made known to physicists this curious property of the induction discharge, of traversing glass without breaking it or illuminating the interior, some surprise may have been excited at such an electrical manifestation. But now that the numerous researches in England on the electric condensation produced in submarine cables have cleared up the question of electrical transmission through various bodies, there is no longer cause for this surprise. The phenomenon is explained by conceiving that, under the influence of condensation, the molecules of the insulating body become polarised after the manner of liquid molecules in electrolysis; so that they all conduce, individually and separately, to conducting the discharge from one surface to another of the glass plates. This is what the English have called *electrification*, and it is complicated by a momentary absorption of part of the charge; this absorption varying with the electrostatic capacity of the insulator. This subject is already well known, and I will only say here that it results from the mode of electrical transmission, and the insulating nature of the surfaces thus electrized, that the electrical charges not being capable of displacement from one point to another to take at the moment of discharge the path of least resistance, as in the case of metallic surfaces, the discharge cannot be concentrated in lines of air, but is forced to continue divided, except in the case in which the air-layer between the insulating surfaces is humid, when, these surfaces becoming conductive, the experiment is similarly conditioned to that of a discharge between two metallic surfaces.

The condensed effluve of induction may, in certain circumstances, present the curious aspect of stratified light (so well marked when the induction spark passes *in vacuo*). To obtain this, one of the plates should be slightly inclined upon the other, forming an acute angle. If one of the armatures is formed by a water-layer, kept in position by a border of mastic, the stratifications may be distinctly perceived; and they are made to disappear when the plates are restored to the parallel position. These stratifications are also observed when the space occupied by the effluve is broad and free of air.

The intensity of the electric effluve depends on the relative dimensions of the armatures and their polarity. It is a maximum when the smaller of the two armatures is positive. There is then seen about this armature a beautiful luminous radiation, and if the armature is cut so as to represent a silhouette, it stands out as a Chinese shadow on a luminous ground.

I will not dwell on the physical effects of the effluve, as these have been described at length in my notice on the Rhumkorff apparatus; but will simply point out that from an electro-chemical point of view, it may result from the difference of temperature between the effluve and the spark, that under certain conditions the one will act in the opposite direction to the other. Thus, from M. Jean's experiments, it seems demonstrated that ozone is only produced easily in atmospheric air at a low temperature, while at a high temperature the electrization of the air causes the combination of its two constituent elements, a fact put beyond doubt by the experiments of M. Ed. Becquerel. It results, that according as we cause the effluve or the spark to act on an enclosed layer of air, we obtain ozone or hyponitric acid; and, in certain conditions, this difference of action may produce a combination or a decomposition. In the case of the spark traversing enclosed air, as in M. Becquerel's experiment, a combination is obtained; but, on making the effluve react upon carbonic acid, as M. Jean did, this acid is decomposed into ozonized oxygen and carbonic oxide. In other cases the effects produced might be inverse, especially where the presence of ozone is necessary to determine a combination, as in a remarkable experiment by M. Thenard.

The foregoing facts prove clearly, then, that the mode of electrization by the effluve is not at all the same as that produced by the spark.

The electric effluve has formed the subject of several important works, by MM. Grove, Thenard, Houzeau, Jean, Boillot, &c. I will here give some details (because they appear to have been forgotten) of certain curious experiments made by Mr. Grove, who, in 1856, succeeded in producing instantly, by means of the effluve on plates of glass, images similar to those of Moser. He placed between two glass plates, used for producing the effluve, a sheet of paper on which something was written, *Volta, e.g.;* under the influence of the effluve, the parts of the glass surface in contact with the lines of writing being impressed in a different manner from the other parts, it was sufficient on taking up the plate to breathe on its surface, in order to render visible an image of the writing; and by exposing to the vapors of hydrofluoric acid, an engraving on the glass was obtained.

For employing the effluve in electro-chemical experiments, two methods have been adopted. One consists in cementing together the two plates by their edges, allowing two tubulures for the entrance and exit of the gas; the other, in making the condenser with three tubes introduced one within the other, and so arranged that two of them enclose an annular liquid armature, surrounding at a distance of two or three millimetres the third tube, which contains the second armature. The former sytem has been employed by M. Jean, in his researches on ozone and carbonic acid; the latter, designed by M. Thenard, is the more perfect and practicable. The use of armatures of colorless liquid, besides affording facilities in watching the progress of the phenomenon, obviates the disruptive discharge which always occur with solid armatures at their contact with the glass, and which hinder the regularity of production of the effluve. These discharges are distinguished in the form of luminous lines, when one looks in the direction of the edge of the glass plates in this kind of condenser. In M. Boillot's apparatus, the armatures are of pulverized carbon, but I question if this acts so well as the liquid armatures.

HEAT AND ELECTRICITY.

The scientific papers contain lengthy articles on the property of highly heated metals discharging electricity; and many are trying to deduce from this a theory of a newly discovered relation of heat and electricity. With all respect to such eminent savants as M. F. Guthrie, who has laid the account of many interesting experiments before the Royal Society in London, we fail to see anything in them which is not only in direct keeping with the long since known and established laws of electricity, but a necessary result of the same. We believe therefore that any new theory is totally uncalled for. It is well known that cold air is an isolator. All our knowledge of electricity is due to this simple fact, because if air was a conductor all possible electric charges would constantly be lost and escape observation. Rarified air, however, whether it be rarified by diminished pressure or by the expansion due to heat, becomes a conductor, as proved by the well-known experiments in vacuo, Geisler's tubes, etc. The layer of air surrounding a heated body is of course in a condition of expansion by heat; it is thus a good conductor and becomes charged with the same electricity as the heated body. It is then repulsed, and makes place for other air; but to this is added the important fact that this rarified air is lighter, will ascend, and a rapid upward current of rarified air, charged with electricity, is generated; fresh air from below continually takes its place, is heated, expanded, charged, is repelled, ascends in its turn, and so a powerful charge may be dissipated in a very few seconds. That flames have a very great power of discharging electricity is a fact well known long since, and due to the same cause, working here still more energetically. The peculiarity that at a certain temperature below the red heat a heated body has the capacity to discharge negative electricity in preference, and retain traces of positive electricity, is also in accordance with the acknowledged fact that our atmosphere is naturally and ordinarily in a positively charged condition, and the earth's surface negative. Of course a negatively charged body will be easily neutralized in a positive atmosphere, which, having itself such electricity, will tend to preserve the charge in a positively charged body. When the body is very hot, however, the air currents are so strong that this preserving action of the air is overpowered, and both kinds of electricity are equally discharged. The details of the experiments all confirm the above explanation; for instance, it is stated that a white-hot platinum wire will exercise much greater discharging power than a large mass of iron at 212° Fahr. This is as it should be. A white-hot platinum wire induces much greater expansion, stronger currents of air, and heavier electric charges of the ascending air than a moderately heated large body.—*Manufacturer and Builder.*

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NEW RESEARCHES IN MAGNETISM.

The *Revue Industrielle* contains a communication of considerable importance, recently made to the French Academy of Science by M. Jamin, relating to new researches into the properties of magnets:

Since the development of physics, steel magnets have been frequently employed, and many have studied carefully their qualities and attempted to discover the best mode for their construction. Up to the present, however, all that has been determined has been without system, and all the processes of fabrication practiced have been at best empirical. In brief, no one could point to any strict theory connecting the phenomena or affording a means of ante-calculating the effects of a magnet. It is this theory which M. Jamin has found, and of which he publishes the fundamental principles. Its development, it is safe to add, will not be difficult, for the researches which remain to be accomplished are all indicated and present no serious obstacles.

The following is the course pursued: M. Jamin first sought for the distribution of magnetism in a magnet formed of a single plate, and perceived that it could be represented by a curve of two branches comprised between the line of the poles and two perpendiculars to this line, one above the north pole, for example, and the other below the south pole. A second leaf being added to the magnet, the curve became less concave, and with a third plate a similar and increased effect was produced. Finally, with a certain number of plates, the curve resolved itself into a right line. Thus formed, the magnet is termed by M. Jamin *aimant normal* (normal magnet), and it is easy to see that such a magnet should present especial facilities for study. The quantity of magnetism is measured by the surface of the two rectangular triangles, which the figure forms; the poles of the magnet are at the height of the centers of gravity of the two triangles, etc.

But this "normal magnet" has a very important property which the above does not necessarily indicate. It is "*maximum*," that is to say, if new plates also well magnetized be added to the first, no further augmentation of magnetic intensity will be found; a fact explained by the consideration, already indicated by Coulomb, that each plate acts contrary to its neighbors. When we say that the magnet is thus maximum, it must not be concluded therefrom that the addition of new plates would not augment its force if the poles were provided with armatures of soft iron, which imprison the magnetism. In such case, in fact, to give to the armatures a magnetic intensity equal to that of the plates, the number of the latter must be augmented above the maximum noted. The magnet thus armed is able to carry a much greater load than when it is simply composed of plates of steel.

These fundamental points established, M. Jamin has since studied the influence of the breadth of the plates and that of their length, one of which acts on the quantity of magnetism, the other on its intensity. He has finally determined that a magnet of given thickness, composed of several plates, has more intensity than one formed of a single plate of equal thickness, and he has therefore been led to construct magnets of plates of steel made very thin.

We cannot, in the absence of further and fuller investigations, enter into the subject at present in greater detail; but the reader will understand how greatly the improvement of magnets, which will result from this beautiful theoretic study, will lead to better facilities in the construction of the magneto-electric machines which, under so many different forms, are to-day employed in industrial pursuits.

ON ENERGY.

By Professor Robert Stawell Ball, A. M., L.L.D.

The science of energy, which has been developed within the last twenty-five years, appears to have a grand future, as intimately connected with astronomy, mechanics, light, magnetism, electricity, even with life itself. It leads us back through periods, compared with which geological time is nothing, and looking forward, like a time-telescope, points out the ultimate destiny of the universe.

Energy is the capacity for raising weights. The distinction between force and energy is that: Energy is the product of a force and a distance. The unit of energy is the energy required to overcome the unit of force through the unit of distance. Energy can be stored in a rapidly moving fly-wheel, as can be demonstrated by experiment. Energy is also stored in any body moving rapidly, as, for example, a cannon ball. Energy of this kind is termed "kinetic energy." A steam engine is a means of turning into mechanical work a portion of the energy contained in the coal consumed in the furnace. Heat may be turned into mechanical work in other ways; for example, a thermo-electric battery. The energy stored up in coal, gunpowder, or a compressed spring, is denominated "potential energy." Food and fuel are both forms of potential energy; but the former has to replace the wear and tear of the machine which consumes it, which the latter has not.

Energy can be changed from one form into another. The potential energy of the body may be converted into mechanical work by raising a weight; into kinetic energy, by setting a wheel in motion; into heat, by friction; into electricity, heat and light, by Wild's electrical machine.

A piece of zinc may be burned in a stream of oxygen. The potential energy becomes light and heat; but it might have been more slowly burned in a battery; it would thus develop electricity, which might be turned into kinetic energy by an electro-magnetic engine, or into light, sound and heat, by a Ruhmkorff's coil.

Energy is indestructable. If it disappears in one form, it is only to reappear again. A hammered nail on an anvil becomes hot; the energy which moves the hammer is transformed into heat in the nail; it is not lost. Friction appears to consume energy, but this is not so, for if proper appliances are used sufficient heat can be collected to boil ether or even water. Savart's apparatus is another instance; the kinetic energy of a rotating toothed wheel being by it transformed into sound.

Perpetual motion is impossible, because some energy is always uselessly expended in friction in every machine, and energy cannot be created. No water-wheel could pump up sufficient water to supply itself.

It has been (fallaciously) proposed to work a magneto-electric machine by a steam engine; to decompose water with the electricity, and sustain the action of the steam engine by the heat developed by burning the oxygen and hydrogen produced by the decomposition. It would be impossible for the steam engine to decompose enough water for the purpose.

Since, therefore, energy cannot be destroyed, and cannot be created, the quantity of energy in the universe must remain constant. This is the principle of the conservation of energy.

All the different forms of energy in the earth, whether derived from food, fuel, wind, or water, can be traced to the heat radiated from the sun. The heat is sustained in the sun by the transformation of potential energy into heat due to the sun's contraction. If the diameter of the sun diminished 1-10,000th part, heat sufficient to supply the present loss by radiation for 2,000 years would be produced.

The heat of the stars represents a prodigious quantity of energy. The earth has a store of potential energy due to its distance from the sun; this energy is equivalent to as much heat as would be produced by the combustion of 6,000 globes of coal, each as large as the earth. Beyond this, it has an amount of energy due to its velocity in its orbit, equal to that which would be produced by the combustion of fourteen globes of coal of its own size. To this must be added a quantity of energy due to its rotation on its axis.

A period of rest, however, must at length come. The planets, since they are not rigid bodies, must ultimately fall into the sun. Heat diffuses itself, but heat cannot be turned into mechanical energy, except when transferred from a hot body to a cold body. When, therefore, by the diffusion of heat, the temperature is uniform throughout the universe, mechanical work must cease.

GRAMME'S ELECTRIC LIGHT.

Gramme's electric light is produced by the application of rotary magnetism, and the comstruction of the machine is briefly this: A ring of soft iron encircled with an endless coil of copper wire is rotated between the two poles of a strong magnet; that half of the ring which is in proximity with the north end of the magnet takes south polarity; whilst the opposite half, near to the south end, takes north polarity; the two neutral points of the system being equi-distant on each side. When the iron ring with its wire convolutions is rotated, the polarity of the ring remains unchanged in position in regard to the operator, so that the action is equivalent to the coils alone being rotated over a stationary ring-shaped magnet. The effect of this is to produce currents in the two halves of the ring, in opposite directions, between its two neutral points. At these points, however, contacts are placed which touch in succession a series of studs in connection, at regular intervals, with the wire coil, so that the opposite currents in the two halves of the ring, instead of neutralizing each other, join together and form a single current. The light is concentrated by a huge lens, made by Messrs. Chance, of Birmingham. M. Gramme has received a prize of 50,000 francs from the Committee of Industry of the French Academy, and his machine is being rapidly introduced in France. A motive power of 2½ horses produces an illumination equal to eight thousand candles.

Solar Heat as a Tool.—During the recent building of a bridge in Holland one of the traverses, 465 feet long, was misplaced on the supports. It was an inch out of line, and the problem was how to move it. Experiment proved that the ironwork expanded a small fraction of an inch for every degree of heat it received It was noticed that the night and day temperature differed by about 25 degrees, and it was thought this might be made to move the bridge. In the morning the end out of place was bolted down securely, and the other end left free. In the heat of the sun the iron expanded, and towards night the free end was bolted down, and the opposite end was loosened. The contraction then dragged the whole thing the other way. For two days this experiment was repeated, till the desired place was reached. We find no record that the heat of the sun has ever been employed in this way before, but the contraction and expansion of iron bars by fire-heat has already been used to move heavy weights over short distances. Broken walls and strained roofs and arches have been brought into place by simply heating iron rods till they expanded, then taking up the slack by screws and nuts, and allowing contraction by cold to pull the wall or roof into place.

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CORRESPONDENCE.

SAVANNAH, GA., May 21st, 1873.

To the Editor of the Journal of the Telegraph:

Without entering into a review of the comparative merits of the different alphabets in use in various parts of the world, as regards their respective claims of speed and safety, there are a few points quite worthy of serious consideration before any changes are made in the Morse arrangement of the characters, viz.: Will the number of errors resulting from the use of the Morse alphabet, taken in proportion with the number of operators, messages, and length of circuits, demonstrate an inferiority to the Continental or other system?

Has investigation adduced the fact that the operators of the Continental system have achieved a nearer perfection of safety and rapidity than Morse operators of equal experience and ability?

Has careful experimenting demonstrated that the dots, spaces and dashes of the Morse alphabet are more subject to atmospheric effects than the dots and dashes of the Continental alphabet?

Does it not appear that it would be as reasonable to propose a change in the English language because of the extent of the grammatical errors daily and hourly exhibited in its spoken and written use by uneducated people, as to assume the necessity of an *improved* alphabet because unskilled manipulators and uncultivated auriculars *remorselessly* disfigure its symmetrical proportions and disturb its harmonious flow?

The remedy for errors is not in the change of an alphabet, which is in use upon the longest and finest telegraphic circuits in the world, and practised by the most skillful operators, but rests with the proper selections of operators by regular competitive examination, with positions according to ability, and prospects of advancement proportionate with improvement. Nature has an extremely interesting order of progression which telegraph corporations might follow with advantage to all concerned. There is considerable telegraphic animalculæ quite out of its element, and some mastodons confined in too small pastures.

F. P. B.

BERWICK, Pa., May 23, 1873.

To the Editor of the Journal of the Telegraph:

We notice with regret, the proposed wholesale change in the Morse alphabet, and beg leave to speak a word in favor of part, if not of all of it. The principle, and, in fact, only objection to our old stand-by, is the spaced letters, and consequent liability to error on this score. Admitting that these are faulty, why, in the name of common sense, should the innocent suffer for the guilty. Why should we condemn twenty-one good letters, in whom there is no guile, because six of their associates happen to be shaky; why not court-martial the six, and substitute something better, if they be found guilty. It seems to us it would be about as reasonable to discharge the whole force of operators, because the company happens to have on that force a number who rejoice in the title of the undersigned. The objection to the spaced letters is, that the liability to err is so great in receiving or transmitting them. We grant that there are a great many errors in this way, but then, so are errors made in the other letters, and so there would be in any alphabet that could be adopted, as long as operators are careless or very excitable, as you *occasionally* find one at present. However, as there is no use in growling at anything, unless one has something to offer as a substitute—good or bad—we would propose something as follows to replace the defective letters. The letters to be expunged are C. O. R. Y. Z., &c. Could not a selection be made to replace them. We don't profess to know much about this matter, but that some arrangement like this would be preferable to wholesale slaughter, is the earnest opinion of

TWO PLUGS.

BURLINGTON, Iowa, May 11th, 1873.

To the Editor of the Journal of the Telegraph:

Your issue of May 1st contains a communication from Winthrop, Me., signed "Winthrop," relating to the change of instruments in Scotland in 1857, in which the writer asserts that at the expiration of the specified period allowed by Mr. Culley "only one man was disqualified, and he is now train despatcher on the C. B. & Q. R.R. and a first-class Morse operator." I never liked flattery, so I disclaim all title to the complimentary portion of this sentence; but, as I believe myself to be the imaginary "disqualified" individual referred to, please allow me to make a few remarks on the subject. As stated by Mr. C. F. Varley in his article written in December, 1867, every operator was furnished with an explanatory copy of the new alphabet and signals; *two months* were allowed for its study, and a day named for the change. The two months expired, the day arrived, but many were not ready for the change. *Another month* was granted with a similar result. Pressure was then applied to the pocket, in the form of a promised reduction of the salaries of those who at the expiration of the third named period should be found unable to make the change, and when the day arrived *every one* was found prepared—that is, we were all "plugs," or beginners. This is the first I have heard of Mr. Culley's "fortnight orders." Probably the story is a little joke of Winthrop's, but its lack of foundation deprives it of any point it might have possessed.

I confess that I liked the change of instruments then just as little as I like the proposed adoption of the European Alphabet in this country now—changing is not my *forte*.

I used the Bain Alphabet in Scotland for over eight years, and have worked Morse since 1865.

> "I've paced much this weary mortal round,
> And sage experience bids me this declare,"

that I consider the Bain Alphabet the more accurate, but slower and more clumsy than the Morse. The latter is decidedly the fastest alphabet. I prefer Morse, with its spaces and varying dashes, to the heavy dragging letters and numerals of the Bain. The spaced letters are objectionable, but it will be difficult to substitute anything better. Incompetent and careless operators cause more mistakes than the spaced letters ever will.

EXPERIENTIA DOCIT.

ROSE HILL, April 21, 1873.

To the Editor of the Journal of the Telegraph:

I wish to say a word or two in regard to the alphabet. I dislike the European because its chief difference to ours is—it drops the spaces and inserts letters and figures already in use, so as to confuse and confound; one would have a double study in rooting out old and planting the new characters in his mind. Why not (as a former writer proposes) "force every operator to write Morse," or let our figures remain as they are (for I see nothing objectionable in them); drop our spaces and insert dots and dashes. F .—., J .———, &c., &c., seem good enough. For example, drop .. . for *c*, and use .·—— — or something of the kind. What is the use of forcing us to learn an entire new alphabet, or one that uses J for C, 1 for P &c., &c. I can see no sense in such a change, but will welcome one which simply condemns the *defects* in our present method, inserting dots and dashes where are now spaces.

COYOTE'S OWN BOOK.

YORK, York Co., ME., May 26, 1873.

To the Editor of the Journal of the Telegraph:

Now that we have had a word with regard to the change of the alphabet, from a variety of sources, allow one more "plug" to be put in a word of opinion, and also offer a suggestion.

I do not know the originator of the contemplated change, but I think it must have originated with some person who has a natural propensity to try experiments without looking at the expense or results even.

I would favor any move that might tend to the good of any enterprise, but utterly fail to see what good can *ever* come of a change from the old "Morse," with which every operator in America is fully conversant.

The Morse has been in existence for twenty-nine years, and probably no good operator has ever had just occasion to complain.

It seems to me to be as equally consistent for certain people to try to introduce a newly arranged form for writing, just because Mr. A. does know how to make some particular letter, (not one in twenty who can write, can make a respectable looking *æ*), or because Mr. B. can't read a letter unless it is written very plain

I am free to confess it is hard sometimes, but the man *who can* readily read "a lawyer's letter," does not complain. It is the poor reader who complains; but is the style of writing to be changed, forsooth!

So with those who read and write the telegraphic language; the fault is in the operator. No blame can be attached to the alphabet for errors committed by a blundering operator.

Let operators come up to the standard, and no fault will be found with the system which is now so perfect that it cannot be improved by adopting any foreign dots and dashes.

G. F. PLAISTED.

BRIGHTON STATION, May 25, 1873.

To the Editor of the Journal of the Telegraph:

I have but little to say about the contemplated change in the Morse system of telegraphing. What I have to say is in direct opposition to any change whatever. We are doing, and have done as well with the system we are now using as we can do with any other.

There will be as many mistakes made with any other system as with the Morse. What good will result from any change? I can see none. We will have "plugs" (and therefore "bull" messages, with any system, and it is obvious, that by introducing a new system, the only improvement will be in the quantity of "plugs." We have some first-class operators now, but introduce a new system, and there will not be a first class operator in the country for six months.

It is claimed by some that if other characters were substituted for those now in use, representing the spaced letters, and the letter L, mistakes would be less frequent. I think this is incorrect. A majority of the mistakes that are made arise from neglecting to space between letters. No operator will deny that this is the case; if he does, all I ask is for him to notice how many operators with whom he is in daily communication space between letters as they should? This fault would be as common with any other system as with the Morse.

Let us leave the Morse system as it is, and use no other; we can have no better; if we could, a change would be necessary. Let us do nothing that will subject us to the charge of lacking in respect for the father of the telegraph, and the originator of the telegraph system as practiced in our great country.

A. G. LIVINGSTONE.

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CINCINNATI, May 23, 1873.

To the Editor of the Journal of the Telegraph:

I have had an idea of giving you my opinion in regard to the proposed change in the alphabet, but an exceeding press of other matters has prevented. It seems to me the objection raised by Supt. O. H. Booth, in regard to the additional time that would be required in R. R. business, where quantities of figures are used, is *vitil*. I have one suggestion to make, however, that seems to me tangible, and one that will cause no serious delay to business or confusion, viz.: simply abolish the Morse character "&" (. ...). This will obviate the "Gill & Pie' bull (which, by the way, recently turned up here again), and many others of similar character.

It is my opinion that when it is fully understood that ". ..." means "E S," and nothing else, that many provoking errors will be prevented. Let us have an expression on this point.

GEO. T. WILLIAMS.

To the Editor of the Journal of the Telegraph:

I desire to enter my protest against the adoption in this country of the European Alphabet, and will briefly state my reasons for opposing it.

In the first place it would inevitably create much confusion, as it would make blundering students of as all. It would be as difficult for operators to learn that — · — · meant C, and · — · R, as it would be for a person, who had all his life been accustomed to the English language, to learn that "yes" meant "no," and *vice versa*. To be sure we could become aware of the fact in a few minutes, but it would require months of practice before it would come natural to us, and until it did "come natural," we could not possibly be good receivers.

Doubtless, most operators remember the time when, while copying one word they would miss the next; and, I think, all will agree with me when I say that no operator can be a good receiver until every character conveys its meaning to the brain, without the slightest effort of thought. Time alone can suffice for this; and if a new alphabet were adopted, it would be months before the best and quickest of us could become reasonably good receivers.

In the meantime, business delayed indefinitely, and mistakes innumerable would be the order of the day, resulting in endless complaints and perhaps expensive lawsuits.

Secondly, I oppose it because it is in itself objectionable.

Few of the combinations are good, some of them are almost absurd. Think of · — — — — for the figure one, · · — — — for two, — — — · · for eight, — — — — · for nine, and, oh, climax of horrors! — — — — — for naught. What would be the effect of a hundred thousand, or a million, made with these numerals?

It is claimed that this alphabet is the result of profound thought, and that it is founded on scientific principles. Those who favor its adoption would have us believe that it is the *ne plus ultra* of telegraph alphabets; that in it is embodied the combined wisdom of many superior intellects, and indeed it is heavy enough to represent the momentum of all the brains in Europe.

But, permit me to modestly assert that, if a few of our smart American telegraphers would "put their heads together," they could produce something infinitely better and more worthy the skill of American operators. Imagine some of our experts diligently pegging away at those clumsy combinations. Spirit of Morse, defend us!

The European Alphabet, no doubt does very well for Europe, inasmuch as it combines some of the chief characteristics of the leading nations there. Being stupid enough for an Englishman, heavy enough for a German, mixed enough for a Frenchman, and heathenish enough for a Chinee; but I appeal to the fraternity on this side the water, if there is anything American it?

Our Morse Alphabet is good enough. I do not see that it can be improved, except, perhaps, in the matter of the spaced letters. If it be deemed advisable, let those alone be changed, and the others remain as they are. Taken all through, I think they will compare favorably with any that can be invented. But, if we must have a new alphabet entire, let it be an improved one, which the European certainly is not. H———.

To the Editor of the Journal of the Telegraph:

The proposed change of alphabet, from Morse to the International, is hardly a matter of sufficient importance to operators to justify so much opposition as has been shown lately on their part; but old workmen are sometimes fond of old tools, and even refuse to give them up for newer and better ones. So far as operators personally are concerned, they should not care whether the change is made or not; for if business is not transacted as satisfactorily to the public under the new system as before, the responsibility rests with those who inaugurated the change, not with the operators. There can be no question but that the present Morse alphabet is more rapid than the International, when both "sender" and "receiver" are skillful operators; but it must not be forgotten that the really skillful ones are in a very small minority, while the large majority are the ones that would be most benefitted by the change. One or two of your correspondents state that there would be no trouble if operators would only send "Morse." Very true, and that is just where the trouble is. Very few do send good "Morse," and still fewer send spaced letters correctly, nor can much improvement be expected under the present system. The majority of operators are poor senders, just as the majority of persons in other occupations are poor penmen, while the few only are skillful and correct. These would find no trouble with any alphabet, but for the majority of operators any fundamental change tending to make the art easier to practice would be a lasting benefit, and greatly reduce the number of errors. There are many operators who are good receivers, but poor senders. With them practice fails to effect any improvement; on account of nervousness, or for some other cause, they are unable to control the muscles of the hand sufficiently to write in a plain, legible manner. The spaced letters are an especial affliction to them. Errors, of course, are not always caused by the use of spaced letters, but it is perhaps safe to say that the majority of them, and the most fatal ones, are. This is of course excepting bad penmanship, which is probably the most fruitful of all sources of errors.

To effect the change, the coöperation of the railroad companies would be necessary, in order to benefit that class of operators that most needs it. Otherwise operators at relay stations would be obliged to be familiar with both alphabets. J. J.

CLINTON, N. Y., June 6, 1873.

To the Editor of the Journal of the Telegraph:

Please explain through the JOURNAL the following, in regard to half-rate messages:

A "red" message, containing 16 words, is handed me for B, the full rate being only 30 and 2, 15 and 1 is, of course, one-half, and which, of course, makes the aggregate on the message only 21 cents. This being less than the minimum price adopted by the company for such a message, I decline to send it, except at full rate; others insist that I should take 25 cents and send it along as a "red," which would be manifestly incorrect, as it would not strictly be a *half-rate* message; then what is the rule of the company in this case? DOUGHTY.

Answer.—You should have charged twenty-five cents, and sent the message as a half-rate. See reply to G. W. S. in the JOURNAL of May 15, 1873.

To the Editor of the Journal of the Telegraph:

We have a short line of telegraph put up for the purpose of private communication, and wish to extend it further. We cannot make a ground wire work, and have been forced to use a wire to complete the circuit. Not wishing to do this, we ask you to enlighten us on the subject, not only for ourselves, but, perhaps, others in a like situation.

We use Daniel's Battery, and with a return wire our instruments work finely. H.

Answer.—Your ground connections must have been faulty. Put your plates two or three feet deep in the earth where the soil is always in a moist condition. That will probably overcome your difficulty.

Novice.—"Anything" and "Everything" are not to be found as words in Webster's Dictionary, which is the standard adopted by the Company. Custom, however, has incorporated them into the English language, and they always have been and are at this time each counted as one word, upon telegraph lines. It is not desirable now to question the correctness of their application.

Union 76.—The words "Secr'y, Hope Lodge No. 282," or any other affix to a signature, should be charged for if its transmission is desired.

G. X.—If the sender of a message desires anything besides his signature transmitted, it should be counted and charged for. For instance, a message signed "J. Smith, 10 Wall St.," the last three words should be charged for.

Bn.—The laying of the first Atlantic Cable was completed August 6, 1858.

C. A. G.—Executive Order No. 147, modifying Rule 94, relates to the course to be pursued by Managers and others when called upon by a Court or other legal authority, to produce messages in the Company's possession. You have evidently confounded Rules 93 and 94.

D. H. Dirr.—We cannot inform you as to the prospect for a situation upon the British lines. The cheapest rate of passage to England is about thirty dollars (gold) from New York. The amount of pleasure and benefit to be derived from such a trip cannot be estimated without experience. What might seem a pleasure and benefit to one may be exactly the reverse to another.

Waverley.—There are eight words in "Please send us two thousand dollars ($2,000)." The word dollars is not part of the figure—it is an article in the sense given to the number of two thousand.

Loda.—There are eight words in "Do not send me the flour ordered to-day."

S.—There are seven words in "Eighty cents rates twenty cents per cwt."

J. E. C.—The JOURNAL is sent regularly to every office of the Western Union Company. If you do not receive it twice a month the trouble is with the postal service. The postage is paid quarterly by the office receiving the paper.

H. McDougall.—Mr. A. Hunter, Toronto, Ont., is the agent of the Telegraphers' Insurance Association, for the whole of Canada. Apply through him.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
June 15, 1873.

To all Offices on W. U. Lines:

THE NEW RATES.

On and after July 1, 1873, the rates to squares given on the new tariff sheet will go into effect. The sheet now in use should be carefully taken from the tariff book and the new one substituted. Preserve the old sheet for future reference.

In making the change, managers should see that the number of the sheet corresponds to the number of the square in which their office is located; if it does not correspond the fact should be reported immediately to the Superintendent.

Offices of the Central and Southern Divisions, and all in the Eastern Division, except those east of Maine, will charge the following local rates, on and after July 1st:

25 cents for 25 miles or less.

30 cents for over 25 but not over 50 miles.

The local rate for 75 miles will be discontinued.

The changes in the local and square rates will increase the local rate of 35 cents, and the first square rate of 35 cents at offices in and east of New York State. No other rate should be increased by the adoption of the new rate.

Offices which are not supplied with a new tariff sheet before July 1st should make the necessary application to their Superintendent.

The following changes in the squares of offices named have been made, and will take effect July 1st, 1873:

Lewes, Del., square 60.

Cairo and Mound City, Pulaski Co., Ill., square 329.

Newton, Ks., square 518.

Peabody, Ks., square 514.

Greenport, Mattituck, Riverhead, Sag Harbor, Shelter Island and East Hampton, L. I., N. Y., square 33.

Cochecton, N. Y., Callicoon, Basket, Hankins, Lordville, Narrowsburg and Stockport, Delaware Co., N. Y., Square 58.

Hawley, Honesdale, Lackawaxen, Middaughs, Millville, Milford, Montrose, Montrose Station, Nicholson, New Milford, Pine Grove, Pike Co., Shohola and Susquehanna, Pa., square 58.

Fortress Monroe, Va., square 69.

Huntington, W. Va., square 182

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Brocks Gap, Ala., closed.

Pequot House, Conn., is re-opened as a W. U. office; tariff same as New London, Conn.

Youngstown, Ill., closed.

Rising Sun, Ind., re-opened. "Tariff for Other Lines," 45 and 3 from Aurora, Ind.

Beattie, Ks., re-opened; square 502.

So. Hanson, Mass., closed.

Dentonville, Mich., closed.

Sand Point, Mich., closed.

The following summer offices in New Hampshire will be re-opened for business July 1st:

Crawford House, N. H., re-opened.
Bethlehem, " "
Glen House, " "
Gorham, " "
Mt. Washington, " "
Mt. Washington Depot, N. H., re-opened.
Profile House, " "
Twin Mountain House, " "
Waumbeck House, Jefferson, N. H., re-opened.

Business for Mt. Washington Depot, N. H., should be checked to Crawford House, N. H., and Mount Washington, N. H., to Glen House, N. H.

The tariff to or from the above "Summer Offices" in N. H., "except Gorham," is 20 cents more than rate by "square." Tariff to Gorham, from offices in Vt. and N. H., will be 20 cents more than square rate; from all other offices, tariff will be 25 and 1 "for other lines" from Portland, Me.; check Portland.

The P. O. A. of Grant, N. Y., is Brakenstraw, Chautauqua Co.

Lebanon Springs, N. Y., re-opened.

Overlook Mountain House and Woodstock, N. Y., re-opened. "Tariff for Other Lines," 30 and 2 from Rondout, N. Y.

Trenton Falls, N. Y., re-opened.

Havana and Watkins, N. Y., are now W. U. offices, square 83; check direct.

Boon Hill, N. C., changed to Princeton.

Florence, O., closed.

Liberty, Guernsey Co., O., re-opened; square 170.

Business for Hauto, Pa., will hereafter be checked direct; square 66. The P. O. A. is Hauto, Nesquehoning P. O.

Messages may be taken for the Penna. Lunatic Hospital at Harrisburg, Pa., and the State Hospital for Insane at Danville, Pa., former to be delivered from Harrisburg, Pa., and the latter from Danville, Pa. Fifty cents for delivery should be collected in both cases.

Jacksonville, Texas, closed.

Hereafter the "Tariff for Other Lines," from Sherman, Texas, to Paris, Texas, will be 65 and 4.

Highgate Springs, Vt., re-opened.

Sewall's Point, Va, re-opened. The office will hereafter be in square 69.

Jordan Bridge, Alum Springs, Va., re-opened; square 142, The office wil. hereafter be known as Jordan Alum Springs, Va.

Hereafter the "Tariff for Other Lines," from Portland, Oregon, to Walla Walla, W. T., will be $3.00 for 10 words and $1.00 for each additional five words or less.

Berkeley Springs, W. Va., re-opened.

Old Sweet Springs, W. Va., re-opened.

NEW OFFICES.

276 Salt Creek, Ala.
* Boggs, Cal., 30 10 Colusa, Cal., ck. San Fran.
* Grand Island, Cal., 30 10 " " " "
* Princeton, " 30 10 " " " "
* Sycamore, " 30 10 " " " "
* Colt's Factory, Conn., 15 1 32 Hartford.
238 Leesburg, Ga.
327 Kinney, Ill.
368 Swan Creek, Ill.
289 Battle Mountain, Ind.
456 Armstrong, Kansas.
122 Deer Park, Md.
* Boyd's 20 1 77 Washington, D. C.
* Rockville, 20 1 77 "
* Silver Creek, 20 1 77 "
* Tuscarora, 20 1 77 "
240 Bath, Mich.
220 Waterford, Mich.
333 De Soto, Miss.
332 Mayhew, "
332 Tibbee, Miss,
464 Bell Creek, Neb.
501 Hooper, Neb.
106 Princeton, N. C.
181 Glenwood, O.
* Bloomville, O., 45 3 191 Mansfield, O.
* Bettsville, O., 55 4 191 "
Bloomfield, O., 45 3 159 Youngstown, O.
New Washington, O., 35 2 191 Mansfield, O.
North Bristol, O., 45 3 159 Youngstown, O.
New Lyme, O. 45 3 159 "
Rock Creek, O., 45 3 159 "
Woodville, O., 55 4 191 Mansfield, O.
112 Bell's Mills, Pa. P. O. A. is Antestown.
94 Bailey's, Pa. P. O. A. is Bailey's, Newport P. O.
76 Halifax, Pa.
66 Tremont, Pa.
112 Mill Creek, Huntingdon Co., Pa.
94 Manayunk, Mifflin Co., Pa. P. O. A. is Manayunk, McVeytown P. O.
* Port Ludlow, W. T., 50 25 Seattle, W. T.; check San Francisco.

Offices having "Special Sheet A" will check Tremont, Pa., 20 cents more than "special rate" to Philadelphia. Square rates not to be increased.

Half-rate messages may be taken for, and received from, Sulphur and Honey Grove, Tex.

WILLIAM ORTON, *President.*

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, June 13th, 1873.

EXECUTIVE ORDER, No. 148.

No superintendent, manager or disbursing agent of this company is authorized to obtain vouchers in advance of their actual payment; and all employees are notified not to sign receipts except upon tender of the money, unless they choose to sign at their own risk.

WILLIAM ORTON, *President.*

TRANSFER SERVICE.

EXECUTIVE OFFICE,
New York, June 14th, 1873.

Mr. FRANK JAYNES of the San Francisco Office, has been appointed Transfer Agent for the Pacific Division, and all transfers for offices in that Division will be hereafter addressed to him instead of to Mr. James Gamble, as heretofore.

WHEATLAND, Pa., in C. O. Rowe's district, has been closed as a money order office.

GEO. H. MUMFORD,
Vice President.

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKNOWLEDGMENT OF RECEIPTS FOR ASSESSMENTS UP TO AND INCLUDING JUNE 10TH.

ASSESSMENT No. 42.

15 131 188 277 312 333 380 576 662 676 870
943 1006 1034 1199 1267 1519 1620 1666 1742 1813 1826
1849 1909.

NOS. 42 AND 43.

6 17 23 28 37 46 56 58 59 60 64
65 74 86 90 103 104 113 122 133 140 145
175 208 211 215 235 269 276 286 301 302 346
349 351 352 371 372 381 383 391 434 447 459
464 509 510 516 547 549 553 562 564 587 626
656 672 703 704 714 734 740 742 791 821 880
858 859 874 880 917 922 923 932 977 1001 1013
1039 1046 1047 1068 1088 1090 1143 1144 1183 1282 1345
1259 1260 1298 1300 1303 1304 1306 1329 1357 1368 1409
1429 1440 1489 1516 1518 1527 1554 1562 1568 1571 1587
1629 1630 1678 1680 1695 1725 1737 1763 1809 1862 1868
1894 1903 1919 1929 1941 1950 1956 1963 1970 1971 1994
1995 2002 2009.

NOS. 39, 40 AND 41.

173 276 346 495 496 505 692 1496 1553 1739 1810

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THE TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ORGANIZED IN 1867.

The heirs of deceased members receive one dollar from each of the surviving members of the Association.

All engaged in the Telegraphic service are eligible to membership, if in good health and of good character and habits. Initiation fee, $1.50.

Blank forms of Application and Restoration may be had of the Secretary, or of any of the following Agents :

Albany, N. Y.	Chas. C. King.
Augusta, Ga.	J. M. Crowley.
Atlanta, Ga.	J. Herrick.
Baltimore, Md.	Archd. Wilson.
Buffalo, N. Y.	J. W. Tillinghast.
Cincinnati, Ohio.	F. A. Armstrong.
Charleston, S. C.	J. D. Easterlin.
Chicago, Ill.	W. C. Long.
Cleveland, O.	H. L. Melton.
Clinton, Ia.	E. O. Wait.
Dubuque, Iowa.	E. Sholes.
Erie, Pa.	G. W. Baxter.
Erie R'y Telegraph.	W. J. Holmes.
Harrisburg, Pa.	H. A. Clute.
Indianapolis, Ind.	D. C. Hinsdale.
Louisville, Ky.	Wm. Debree.
Mobile, Ala.	Wm. Sandford.
Memphis, Tenn.	J. J. Fowler.
Milwaukee, Wis.	D. H. Henshaw.
New Orleans, La.	Jas. T. Aleyn.
Nashville, Tenn.	E. C. Boyle.
Philadelphia.	James Merrihew.
Phillipsburg, N. J.	John Fuller.
Pittsburg, Pa.	S. L. Gilson.
Peoria, Ill.	Charles W. Heaton.
Richmond, Va.	R. M. J. Paynter.
Syracuse, N. Y.	D. L. Pike.
St. Louis, Mo.	J. P. Cassidy.
San Francisco.	J. S. Urquhart.
Seattle, Wash. Ter.	F. H. Lamb.
Springfield, Mass.	W. J. Denver.
Springfield, Ill.	W. W. Kelchner.
Toronto, Ont.	A. Hunter.*
Vincennes, Ind.	Perry Hood.
Washington, D. C.	M. Marean.
White River Junc., Vt.	G. W. Gates.

Additional Agents will be appointed as soon as practicable.

Applications for membership should be endorsed by the Agent through whom they are made.

Members, in communicating with the Secretary, will always state the Number of their Certificate.

A. S. BROWN, *Treas.*
D. R. DOWNER, *Sec'y.*

* A. Hunter is Agent for all of Canada.

Mr. WILLIAM ARMSTRONG has been appointed superintendent of Police Telegraph, Cincinnati, Ohio, in place of Mr. E. A. SANDERS, resigned.

R. L. NORRIS, formerly of Penobscot, Pa., is requested to send his present address to J. L. Horn, Western Union Telegraph office, Charleston, S. C.

In the *Edinburgh Medical Journal* Dr. Strethill Wright describes what he terms a new battery, consisting of a Smee's arrangement with the zinc and platinum immersed in a solution of bichromate of potash and sulphuric acid.

NEW ADVERTISEMENTS.

L. G. Tillotson & Co., Excelsior Telegraph Instrument—"Rattler" Sounder, &c., &c.

D. Van Nostrand, Telegraphic Journal.

FOREIGN TELEGRAPHIC ITEMS

THE NEW ATLANTIC CABLE.

The Great Eastern having just completed the shipment of a new Atlantic cable and general stores, left her moorings in Sheerness Harbor on Tuesday for Portland, whence, after taking in a further supply of coal, she will proceed to Valentia to commence laying the new cable. The Great Eastern will be accompanied by the steamship Robert Lowe, having on board the shore end of the cable for Valentia, and the steamship Edinburgh, another of the Telegraph Construction and Maintenance Company's ships, with the shore end cable for Cape Breton. Another of the company's ships, the Hibernia, which left Sheerness last week in order to repair the French Atlantic Cable, has also a portion of the intermediate new cable on board, and, on the completion of the repairs of the French cable, will return to Sheerness to take in general stores and a further supply of new cable, and will then join the Great Eastern at Heart's Content. There are at present 2,453 miles of cable on board the Great Eastern. The new cable will be laid from Valentia, Ireland, to Sydney, Cape Breton. After laying the cable the big ship will proceed to Heart's Content to fill up with coal ; she will then proceed to the break in the Atlantic cable of 1865, accompanied by the steamship Hibernia, where she will stay, weather permitting, until the fault has been repaired, after which the monster ship will return to Sheerness to take on board a section of the new cable to be laid from St. Vincent to Pernambuco, a large section of this cable being already manufactured. The Great Eastern is expected to return to Sheerness about the 26th of September next. The vessel is under the command of Captain R. C. Halpin, who, together with the principal part of the staff of the ship, has been employed in laying the Atlantic, British India and China cables. The whole of the petty officers, and the greater portion of the crews of the Great Eastern, Hibernia, Edinburgh and Robert Lowe, have been in the employ of the Telegraph Construction and Maintenance Company since the laying of the first cable, in the year 1864.—*The Railway News, May* 17.

At extraordinary meetings of the British Australian, British Indian Extension, and China Telegraph Companies, recently held in London, resolutions were adopted providing for the consolidation of those companies into a new company, to be called the Eastern Extension, Australian and China Telegraph Company, and for winding up the companies named.

At the meeting on Friday, the 23d ult., of the Great Western Telegraph Company, the special resolutions passed at the extraordinary general meeting on the 8th inst., for the voluntary winding up of the Company and for the sale of its business and property, including the cables made under the contracts with Hooper's Telegraph Works, in exchange for the same number of shares in the capital of the Western and Brazilian Telegraph Company, Limited, were confirmed.

The cable news writer of the Delhi, East India, *Gazette* gives the following statement, which was received on the 22d of March from Turkestan : The Russians have erected a telegraph line in Yarkand, and are going to have one also in Khokand and Bokhara. They (the Russians) had a telegraph line in the districts where they had cantonments, but as they are marching against Urganj they are erecting lines in foreign countries.

THE AMALGAMATION OF THE ATLANTIC CABLE COMPANIES.

At the extraordinary general meeting of the Anglo-American Telegraph Company, the terms for amalgamation with the French Atlantic and Newfoundland Telegraph Companies were approved, and the Board were authorized to complete the arrangements.

At a special general meeting of the French Atlantic Cable Company the terms of amalgamation with the Anglo-American Telegraph Company were presented to the shareholders, and a resolution approving of the scheme was presented, and a poll having been demanded, resulted in its favor by a vote of 32,238 shares against 6,729 shares. A resolution that the company be wound up voluntarily was adopted, and liquidators elected. Other resolutions for carrying out the amalgamation were unanimously adopted.

The total number of messages forwarded from postal telegraph stations in the United Kingdom for the week ending May 10, 1873, was 329,382—an increase on corresponding week of last year of 49,223.

The total number of messages forwarded from postal telegraph stations in the United Kingdom for the week ended May 17, was 337,038, an increase over the corresponding week of the previous year of 57,479.

The receipts of the Atlantic Telegraph companies during the first three months of the current year amounted to £190,000, against £170,000 for the corresponding period of the previous year.

THE Great Northern Telegraph Company notify that land lines from Nagasaki to Simonosaki, Hiogo, Osaki, Yokohama and Yeddo have been opened. International messages are, however, at present only accepted by the Japanese authorities at sender's risk. The Company's charge to Nagasaki remains as before —£4 6s. from London, and £4 7s. from the country —and for the other stations it is £4 17s. from London, and £4 18s. from the country. To ensure certainty of delivery, the Company will, on handing over the message to the Japanese department at Nagasaki, simultaneously forward a copy by post to the receivers.

The steamship Dacia having successfully laid the new cable for the International Ocean Telegraph Company between Cuba and the United States, has sailed for Jamaica, to pick up the lost Panama and Porto Rico cables.

BORN.

HILTON.—At Kawkawlin, Mich., May 29, 1873, to S. M. Hilton, Manager W. U. Tel. Office, a son.

HOTALING.—At Chetopa, Kansas, May 18, 1873, to Ben. S. Hotaling, Manager W. U. Tel. Office, a son.

NICHOLS.—At Semickley, Pa., June 5, 1873, to S. K. Nichols, Manager W. U. Tel. Office, a son.

OWEN.—At Brunswick, Ga., May 12, 1873, to D. G. Owen, Manager W. U. Tel. Office, a daughter.

MARRIED.

CONGDON—HOBLIT.—At the residence of the bride's parents, Atlanta, Ill., by the Rev. S. M. Crissman, W. J. Congdon, agent and operator at Mt. Pulaski, Ill., to Kate Hoblit.

GREGORY—KINSEY.—At Carnak, Ga., May 22, 1873, by Rev. W. F. Smith, W. H. Gregory, Manager W. U. Tel. Office, to Miss Mattie Kinsey.

WILSON—PATTERSON.—At Hudson, Mich., April 10, 1873, H. A. Wilson, Manager W. U. Tel. Office, to Miss Marrilla Patterson.

DIED.

LEBARON.—At Pensacola, Fla., May 23, 1873, Ettie J. Holmes, wife of Charles LeBaron, Jr.

RYAN.—On Sunday, May 25, 1873, after a short but severe illness, Malachi J. Ryan, operator W. U. Tel. Office, Pittsburgh, Pa., aged sixteen years.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, JUNE 16, 1873.

RETURN OF MR. GEORGE B. PRESCOTT FROM EUROPE.

Mr. George B. Prescott, Electrician of the Western Union Telegraph Company, of the Company's commission to Europe, arrived home on the *Scotia* on Tuesday, the 3d instant, in excellent health. Mr. Prescott has been absent between three and four months.

We hope soon to be able to publish the report of the observations of Messrs. Prescott and Eckert upon the telegraph systems of Europe, which we have no doubt will prove deeply interesting to the telegraphers of America.

ANONYMOUS COMMUNICATIONS.

Once again we desire to call the attention of correspondents to the necessity of signing communications they may send to us for publication.

We receive many notices, unsigned, of births, marriages, and deaths; items we would gladly publish as interesting to many of our readers, but which, in following the invariable rule with anonymous communications, go into the waste basket.

WILL not Managers and Receivers exercise a little care in the checking and sending of messages addressed to the officers of the Company? The names and positions of the officials are certainly well known to every employé, and it can only be from carelessness or stupidity that messages addressed to them are, as is frequently the case, checked and sent collect. To correct each error of this nature, one or more office messages are required, burdening the wires with unnecessary business, and involving extra clerical labor.

By some unaccountable error, the Service report for April, which was published in our last issue, contained, among the list of resignations, the name of JOHN L. COLLISTER, Manager of the branch office at Pier 28, North River. Mr. Collister has not resigned, nor has he any present intention of leaving the service of the Company.

EXECUTIVE ORDER No. 148, notifying employees not to sign receipts except upon the tender of the money, will be found on page 214.

HOW CAN TELEGRAPH COMPANIES PROTECT THEMSELVES AGAINST BAD MANIPULATION OF THE KEY?

A great majority of the letters which we have printed during the last few months upon the suggested change of alphabet bear evidence of the reluctance felt by operators in every section of the country to advise the change. The errors, which are of daily occurrence, and which we attributed to the use of the spaced letters, are generally acknowledged by our correspondents, but our conclusions as to their origin are denied, somewhat inconsistently it must be urged, and are placed to the account of bad manipulation. Without doubt this conclusion is correct, but it carries with it the evidence that did not the spaced letters exist, errors could not occur from their use. Many of our correspondents object to a change because the form of alphabet we are using was arranged by Professor Morse, an American, and on that account, if for no other, this form should be retained. We can see no force in this point. As well it might be urged, that because steam was first applied to navigation by an American, that steamboats should be restricted to the appliances of Fitch and Fulton. The alphabet of Morse consists of a combination of long and short signals and spaces, and, no matter in what conjunction they might be placed, there can be no detraction from the credit due to him.

If the telegraph companies accept the conclusions of their operators, as expressed in the published correspondence, a proper consideration for their own protection against loss arising from the errors occasioned by bad manipulation of the key, will force them to take advantage of the only possible way in which comparative safety can exist. This will be found in classifying operators according to their ability, and holding them to a strict responsibility for the damage arising from their lack of skill or judgment. How and by what means this classification shall be effected, is a matter for consideration. Operators who are uniformly careful, and who would bring an intelligent judgment to act upon the business under their charge, regardless of the form of alphabet used, would be benefited, but those against whom protection might be afforded by a change of alphabet, would find a lower level than that now occupied.

A judicious classification of operators is a difficult task, and one that is very ungrateful. Yet, sooner or later, under any circumstances, it will have to be practised. The man who, for many years, faithfully serves his employers, both in will and action, in common justice deserves something more at their hands than the tyro who, with flexible wrist and ready ear, is his equal in making and translating dots and dashes, but who, from inexperience, is necessarily inferior in the general knowledge of the business which renders such services so valuable.

— Mr. J. C. Sherman is manager of the telegraph department of the Great Western Railway, with head-quarters at London, Ontario.

THE NEW TARIFF OF RATES.

The circular from the Tariff Bureau, in this issue of the JOURNAL, should be carefully read and noted by managers and other employés.

It contains instructions in relation to the new and reduced rates, and directs that they are to be put into effect on and after July 1st; that they are entirely to supersede the square and local rates now in use; that a slight increase, for the sake of uniformity, is made in the local rate for distances between fifty and seventy-five miles, and first square rate in certain portions of the Eastern Division; and that, except this increase, no other will be made. All present rates, therefore, which are higher than the new rates, will be brought down.

The change will be found to be the most general and complete reduction of rates ever made by the Western Union Company.

For offices south and west of New York State the reduction of all rates, not "special" (although, probably, more than half the "special" rates are considerably reduced), for distances not over 100 miles, will be about 33 per cent. For distances between 100 and 200 miles, nearly 40 per cent. In the Eastern, for this distance, about 15 per cent. For all distances above 200 miles the reduction is from 25 to 50 per cent. In some cases it is still greater. All districts of the Western Union Company, east of Kansas and Nebraska, will have a uniform scale of rates—the value of which, in the future consideration of the subject of tariffs, can only be thoroughly appreciated by those whose duties have brought them in contact with the intricacies of the present system.

Since the inauguration of the square system, the endeavor to equalize the rates, by reduction, has been unremitting, and it is believed that the schedule which will go into effect on the 1st of July has fully attained the desired object, and that the great concessions therein made by the Western Union Company will be duly appreciated by the public.

SUNDAY WORK.

To all of the employés of the telegraph companies the subject of laboring on the Sabbath is a matter of great interest, and to many the necessities of the service, in administering to the wants of the public on that day, amounts, from what appears to us to be mistaken views of duty, to a positive violation of conscience. In the unfortunate position in which these latter seem to be placed, they are deserving of sympathy, and receive it, yet nothing can be done by the companies to mitigate their condition.

Volumes have been, and still might be, written upon what may be deemed *necessary* labor on the Sabbath day. Theologians have pondered and studied deeply, but the question is still an open one, and will be to the end of time. The true solution, probably, is, that it is a matter of individual conscientiousness, and then it is evident that the convictions of one should not be laid down as law to another in depriving him of what has come to be regarded as a necessity—the free and untrammelled use of, practi-

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cally speaking, instantaneous communication whenever desired. If those of whom we are speaking could view this question in its true character, they would see that the telegraph, in its relation to mankind, is simply a machine connecting distant parties, and that in this machine their individuality is lost. Their duties are not the duties of labor, but consist in administering to the wants of others, and than this there is no pursuit more noble.

Telegraph offices must be open, and messages must be sent, on Sunday, not because a profit accrues to the company by so doing, but because the necessities of the public, and especially the issues of life and death' require it. If it is wrong to prepare food, to minister to the wants of the sick, or to bury the dead on the Sabbath day, then it may be wrong to send messages on that day relating to peril and disaster, and sickness and death. There can be no doubt that some work upon the lines and at the offices must be done on Sunday. Of the necessity of the work the public must be the judge. The telegraph, in its subservient character, has no right, and cannot assume, to establish a standard of orthodoxy for those who require its service. The presumption must be, that the motives of senders of messages are good, and as pure as those which actuate the machinery of transmission.

POSTAL CARDS.

WESTERN UNION TELEGRAPH COMPANY.
TREASURER'S OFFICE,
NEW YORK, June 15, 1873.

A large portion of the correspondence with this office can be advantageously done by the use of the new Postal Cards, in preference to telegraphing or sealed letters.

The weekly reports of gross receipts, from offices within three days of New York, should be sent by the postal cards, and also all letters of advice, inquiry and reply, which do not require any accompanying inclosure.

The attention of managers is requested to this subject, with a view of saving of postage and relief of the wires.

R. H. ROCHESTER,
Treasurer.

THE FRANKLIN TELEGRAPH COMPANY.

At the annual election of the Franklin Telegraph Company, held in Boston, June 12th, the following parties were chosen as directors for the ensuing year, viz.: John Duff, John R. Duff, Oliver Ames, J. S. Fay, T. G. Dexter, W. H. Guion, G. B. Grinnell, G. S. Bowdoin and J. W. Brown.

A MISSING TELEGRAPHER.—Isaac F. Pharo, Lineman Western Union Telegraph Company, stationed at Wilmington, Del., disappeared from that place on or about May 10th. When last seen, he was on a train of the P. W. & B. R. R. going towards Philadelphia. He was about 5 feet 9 inches high, light complexion, brown hair and moustache; wore a black felt hat, dark coat, pants and vest, of Scotch mixed goods, and had on low shoes. He has a wife and two children living in Westchester, Chester Co., Pa. Mr. Pharo has been in the employ of the Western Union Telegraph Company for six months or more, patroling the line with horse and wagon, between Philadelphia and Washington, and was very much esteemed; his absence is a great mystery.

ANOTHER TELEGRAPH DECISION.

Another decision sustaining the validity in law of the conditions contained in the printed heading of the usual telegraph blank, has just been rendered in the Common Pleas Court, at St. Clairsville, Ohio. The action was brought to recover from the Western Union Company damages for the non-delivery of an unrepeated day message, to have been sent from New York to St. Clairsville, in February, 1869, the claim being, that the plaintiffs, who were bankers, cashed certain drafts upon parties in New York, at a total loss to themselves, which loss might have been avoided had they received the non-delivered message, practically informing them the drafts were not good.

The Judge charged the jury, that the burden of proof in an action upon negligence is always upon the party who charges it, as the plaintiff in an action, and that the apparent exception to this rule in actions against carriers is inapplicable, as telegraph companies are not common carriers, and are therefore not insurers as to that which they undertake; and that a telegraph company may limit its responsibility as to unrepeated messages; and, as has been repeatedly held, that a regulation of a telegraph company that it will not be responsible for errors or mistakes in the transmission and delivery of unrepeated messages, beyond the amount paid for sending the same; and that one-half the usual price will be charged for repeating the message is a reasonable regulation, and that parties sending messages on blanks containing such conditions are bound by it.

Under these instructions, the jury found a verdict for the Company, thereby adding another to the numerous decisions sustaining the blank and exempting the Company from liability for errors in unrepeated messages.

REMOVING FALSE IMPRESSIONS.

WORCESTER, MASS., June 6th, 1873.

To the Editor of the Journal of the Telegraph:

Noticing in your paper an extract from the *Springfield Republican*, which has also been copied and enlarged upon by various other papers throughout the country, I would take occasion to say, that so foolish an affair does not merit the attention it has received. The facts are these: Two boys employed by the B. & A. R. R. Co., as night operators, one located at South Framingham depot, Mass., and the other at the B. & A. depot in this city, fell into a foolish quarrel over the wire. The more foolish of the two, unable to restrain his passions, took the first train for Worcester during the night, and upon reaching the depot in this city pummelled his foe in a fashion to satisfy his desire for revenge. Neither party were in any way connected with this office, or the service of the Western Union Telegraph Company. As I have been somewhat annoyed by anxious inquirers from different parts of the country, and wishing to remove any false impressions which may have arisen, I desire to make the above statement regarding an affair which otherwise I should consider unworthy of notice.

E. W. BRADFORD,
Manager.

COURTESY APPRECIATED.

One of the resolutions adopted by the Congressional excursionists who have been visiting the South on a tour of examination, expresses special recognition of the liberality of the Western Union Telegraph Company, in affording to them the use of their wires. Superintendent Clowry is also thanked for his attention to the comforts of the party.

DUPLEX TELEGRAPHY.

(*Correspondence of the London Telegraphic Journal.*)

I note in your Journal of the 15th February, in your article on "Duplex Telegraphy," that Mr. Baggs was the first to add the condenser to the existing apparatus. I had supposed myself familiar with all that had been made public in Europe or this country in double transmission, but the fact, or the mode of the application of a condenser by Mr. Baggs is new to me. Will you be so kind as to note in your correspondent's column in what book I can find an explanation thereof?

The Stearns's duplex has been used for several years in the United States. The longest circuit worked at present is New York and Chicago, 1,000 miles. This is really worked in two circuits, with an automatic repeater at Buffalo, half way. Operators prefer working it to a single wire system, getting off much more business in a day. Two weeks ago, between Buffalo and New York, over 1,600 messages (averaging 25 words each) were handled between 8 a.m. and 6 p.m.

Until its application to very long circuits, with large conducting wire, No. 6, a condenser was unnecessary. But when tried between Chicago and Buffalo, it was found that when the sending key opened, changing from battery contact to ground, and closing one before breaking the other, a portion of the charge in the wire, reversing its direction, flowed back, discharging through the sending relay, and making a false dot, or, as the operators term it, a "kick." A condenser of the same capacity as one half the line wire, was then put upon the rheostat circuit, and upon moving key from battery to ground, the discharge from the line through *one* coil was balanced by the discharge from the condenser through the other. This entirely removed the "kick."

Stearns's system is at work on many circuits of 150 to 400 miles, and is doing splendid work. Mr. Stearns is now in England, with Mr. Prescott and General Eckert. He has a set of his apparatus with him, and will, I doubt not, exhibit its capabilities to all. Like all double transmission systems since Gintl, it follows the general path, varying only in a few essentials, which, though trifling in appearance, have made what was before an experiment and a toy a valuable adjunct to telegraphy.

Mr. Prescott and General Eckert will bear testimony to the efficiency of Stearns's system, as will all telegraph officials in this country.

I am, &c.,
C. H. HASKINS,
Gen'l Sup't, Milwaukee, U.S.A.

North Western Telegraph Company,
Milwaukee, Wis., April 11, 1873.

PUBLIC BENEFACTORS.

Mr. Z. G. Simmons, of Kenosha, who is well known in the Northwest as President of the North-Western Telegraph Company, and Director of the Western Union Telegraph Company, a large owner of several important manufacturing enterprises, has made a proposition to the City of Kenosha, to improve the city park at that place handsomely, and to erect thereon a fine library building, and put into it a $20,000 library, all the improvements, including library, to cost $50,000, all from his own private means.

Mr. Hiram Sibley, of Rochester, N. Y., also a Director of the Western Union Company, has, in addition to his original gift of $60,000 to Cornell University, donated a further sum of $30,000 to the same institution.

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ON THE NATURE OF ELECTRICITY.

By M. Edmund.

We recognize the existence of a subtle substance, elastic in the highest degree, pervading not only all space but even ponderable matter.

We also recognize the fact that if two molecules of this subtle matter or ether are placed apart they repel each other in the direction of their line of junction, and in reverse ratio to the square of the distance. This ether resembles in the highest degree a common gas.

Regarding the nature of this ether and its action, as compared with other kinds of matter, we find that it moves freely from one point to another in certain bodies termed "electric conductors." In this respect it is like common gas in its expansion; the molecules move with the utmost facility and change their places with the slightest effort. But, however, in a non-conductor this facility or mobility is checked, so that the movements of the ether are wholly dependent upon the nature of the molecules of the body in which it is placed.

If the non-conductor is a gas or liquid, the ether, although present, has no mobility, but moves about with the molecules of the non-conductor, as it were, mechanically. At the same time the ether distributes itself equally throughout the fluid non-conductor, and in doing so changes or rearranges the molecules of the liquid, according to the Archimedean principle. The action, however, takes place not by the force of gravity but through the repulsion of the molecules of the ether.

The well-known diamagnetic experiments of Plücker have thrown much light upon the application of this principle. He found that if a magnetic body was suspended in a liquid, but of less magnetic power than the liquid, it would be repelled by the poles of the magnet, and also that a diamagnetic body similarly suspended was more strongly repelled than it would be in a fluid or gas less magnetic.

A molecule of ether is at rest when it is equally repelled in every direction. A material body cannot move under the influence of electric action, if the ether which it contains is equally repelled on every side. But if the repulsion becomes unequal, the body will, if free, move in a direction which is the result of the remaining forces.

We know that a body full of positive electricity contains more ether than in its normal condition, and that body, full of negative electricity, contains less than in its normal condition.

We believe that the galvanic current consists in this: that the ether travels from one point to another in the current, and its intensity is the result or product of the density of the ether, and the speed with which it moves; or, in other words, is proportional to the quantity of ether which travels through the circuit in a unit of time.

For a closed circuit the quantity of ether is the same, whether there is a current or not. No ether is created by the electro-motive forces. Their action is limited to converting an oscillating condition of the ether into a translatory or moving condition. But it must be understood that the oscillatory condition of the ether is the normal condition of the ether, but in the form of caloric. As a result of this action the caloric will disappear at the point where the electro-motive forces become active. This phenomena was observed by Peltier.

The origin of the galvanic current is thus very simple. The electro-motive forces create nothing new, but simply change one form of movement into another. In this they resemble the conversions of mechanical forces.

The numerous experiments made to determine the speed of electricity upon wires has never, and can never produce similar results, for the reasons above stated.

PROPERTIES OF COPPER WIRE.

The following table, showing the various properties of copper wire, was compiled by Mr. J. T. Sprague, and published in the *English Mechanic* in 1871. Its extreme convenience and accuracy will render it very valuable to practical electricians, and for that reason we give it a place in our columns. It will be found more correct in practice than the tables and formulæ given in most of the standard works on telegraphy:

PROPERTIES OF COPPER WIRE—Specific Gravity Taken at 8.9.

Line.	I. Birmingham Wire Gauge. (Holtzapffel.)	II. Diameter in Mils. (d)	III. Area in Circular Mils. (d^2)	IV. Weight. Grains per foot.	V. Weight. Pounds per 1000 feet.	VI. Feet per pound.	VII. Resistance at pure copper at 60° in Ohms, per 1000 feet.
1	1 in. square.	1000.	1273237.	26940.	3848.6	.259833	.0081251
2	1 " round.	1000.	1000000.	21159.	3022.7	.330928	.010344
3	1 cubic inch.	323.73	106108.	2245.	320.71	3.11803	.097501
4		194.	37636.	879.98	54.276	18.425	.576131
5	10	109.	11881.	251.37	35.910	27.314	.870768
6	12	83.	6889.	145.76	20.823	48.023	1.50166
7	14	66.	4225.	89.397	12.771	78.30	2.4484
8	16	49.	2401.	50.803	7.258	137.79	4.3066
9	18	35.	1225.	25.920	3.703	270.06	8.6416
10	20	28.	784.	16.589	2.370	421.97	13.1951
11	22	25.	625.	13.224	1.889	529.38	16.552
12	23	22.	484.	10.241	1.463	683.83	21.3750
13	24	18.	324.	6.856	.979	1021.1	31.9290
14	26	14.	196.	4.147	.592	1687.9	52.7806
15	30	12.	144.	3.047	.435	2297.4	71.8403
16	32	9.	81.	1.714	.245	4084.2	127.715
17	34	7.	49.	1.037	.148	6751.6	211.121
18	|	**6.88**	**47.262**	**1.**	**.143**	**7000.**	**218.890**
19	35	5.	25.	.529	.076	13233.	413.780
20	36	4.	16.	.3385	.048	20677.	646.571
21	|	3.5	12.25	.2592	.037	27006.	844.49
22	|	3.	9.	.1904	.027	36758.	1149.44
23	|	**1.**	**1.**	**.0211159**	**.003**	**330828.**	**10345.18**

In the above table lines 1, 2 and 3 are given chiefly as data of calculation. Line 3 is one cubic inch of copper converted into a foot length. The weights, column 5, and the resistances, column 7, are given for 1,000 feet, for convenience of calculation on the decimal system. When multiplied by 5.28, they give the figures for one mile. Almost any information required may be found from the data given in this table by very simple calculations. For example, if we wish to learn the resistance of a pound weight of any size, it can be ascertained by dividing the number in column 7 by that in column 5.

Line 18 is the wire, of which one foot in length weighs one grain, which forms the basis of calculation. Line 23 is a wire of one mil. or .001 in diameter. These two lines, therefore, furnish constants applicable to calculations of every description.

New Wire over the State Line Railroad.—Poles are being set for a new line of telegraph along the State Line Railroad from Rochester to Warsaw, N. Y., and will soon extend over the whole line. The wire for the Warsaw division has been received, and the work is progressing with despatch. It was the intention to have the line completed to Warsaw by the first of June, and it will be operated for general business by the Western Union Company. The new line will prove a great public convenience.

SCIENTIFIC EXECUTIONS.

Since juries in this State have become impressed with the fact that murder is a crime punishable by death, and not a mere vagary of an "emotional" or other form of insanity, we have remarked some comment relative to the question why the present barbarous mode of execution is not superseded by one of the ready methods of taking life known to science. Hanging by the neck is supposed to cause a dislocation of the vertebræ, but its object is rarely effected. The distance a man should be dropped or jerked upward in order to break his neck depends upon his size, weight and other physical peculiarities, so that it can only be guessed at; and consequently the estimate is frequently incorrect, and strangulation ensues. It is asserted by many that death from the latter, as well as from any other cause involving a stoppage of the supply of air to the lungs, is painless; and, as when respiring foul or noxious gases insensibility supervenes without previous ill-feeling, so the criminal, the moment his weight is brought upon the rope, becomes unconscious, although strong muscular movement may continue. This, however, is a disputed question, and the majority of opinion inclines to the belief that strangulation is attended with all the agony indicated by the contorted features of the sufferer.

Two recent executions in this vicinity, at one of which the pulse of the criminal beat at 108 after five minutes of suspension, clearly show that no matter how great care be taken to ensure speedy death, an absence of suffering due to failure of the preparations at the last moment cannot be guarded against. Hence it is well to consider why a death absolutely certain and painless could not be substituted for the gallows. The advocates of hanging point to its horrible nature, and the degradation of being strung up like a dog in the presence of witnesses, as a moral preventive of crime; but it is doubtful whether a person disposed to murder ever gives a thought to the nature of the penalty, or, even after imprisonment, shudders at aught other than the unknown pangs of death. Of the many mechanical means of execution proposed and practised, probably the surest and most bloodless is the Spanish garotte, but in this, as in hanging, there is a savor of barbarity of which a civilized community can well afford to rid itself.

It seems to us that, for the purpose, no better agent than a powerful electrical discharge could be employed. Professor Tyndall has investigated the effect of lightning strokes upon the human frame, and has arrived at the conclusion that animation and consciousness are instantly suspended; in other words, life is blotted out the moment the current passes through the body. The Professor involuntarily made himself the subject of an experiment of this kind, though fortunately without harmful results. He states that, while delivering a lecture before a large audience, he accidentally came in contact with a wire, from which he received the discharge of a powerful battery of Leyden jars. For a time, he says, his existence was suspended; he was utterly unconscious, although he did not fall nor alter his position. Then, as the effects passed away, he describes the sensation to be as if he had been blown in pieces, each limb feeling separate, and one member after another regaining sensitiveness until he had entirely recovered. The recognition of his surroundings, suggesting where he was, and also the thought of not alarming his audience, were his first efforts of mental consciousness.

While these experiences of Professor Tyndall go to show the instantaneous and deadly effect of large quantities of electricity upon the human frame, other investigations that have been made upon the

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lower animals have given different and varying results. Professor Pepper, in one of his lectures in this city, stated that at one time experiments were made in London in order to determine whether cattle could not be slaughtered by this means. It was found that sheep, after receiving a discharge, underwent powerful muscular contortions, which engendered a strong doubt as to whether sensation were absent. Pigeons were very difficult to kill, and indeed, the only bird which appeared instantly affected by the shock was the common turkey. These facts may be explained by the non-conducting qualities of the wool of the sheep and the feathers of the birds, and in addition the inference may be fairly drawn that such experiments made upon animals afford no data which may with certainty be considered as applicable to man.

The objection that electrical executions would be free from the horrible impressiveness of hangings might be easily obviated. The criminal, for instance, could be exposed upon a platform, in full view of the assembled witnesses, and manacled to a chair, his irons being connected with a battery and Ruhmkorff coil capable of giving, say, an 18-inch spark. The mode of closing the circuit might be a simple button, to be pressed by the finger of the sheriff. Then, when the usual formalities conclude, the latter official establishes the current, the convict instantly expires, and all is over. There would be no slipping nor breaking of ropes, no black cap, no suspension of a writhing form for twenty minutes or half an hour, none of the grim watching for death by the medical attendants, nor any of those hideous surroundings which now only serve as food for sensation-mongers, and prove that a relic of barbarism can still be maintained in the laws of a civilized country.—*Scientific American.*

THE TELEGRAPHIC JOURNAL AND ELECTRICAL REVIEW.

EDITED BY THE

Rev. WILLIAM HIGGS, M.A., LL.D.

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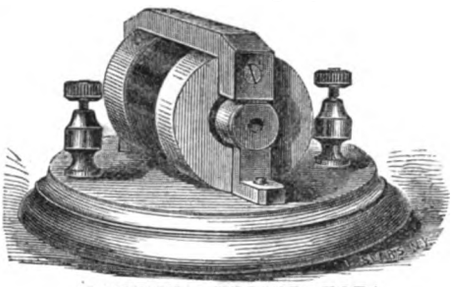
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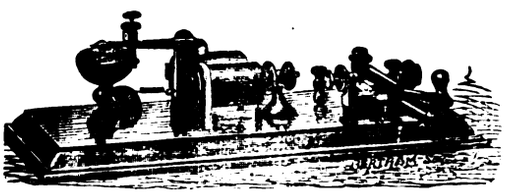
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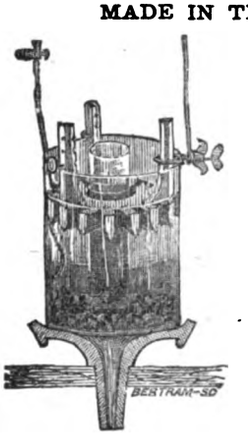
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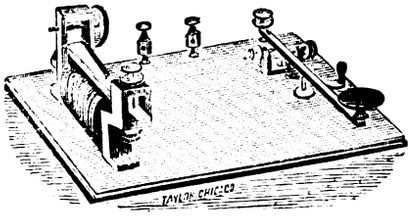
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JOURNAL OF THE TELEGRAPH.

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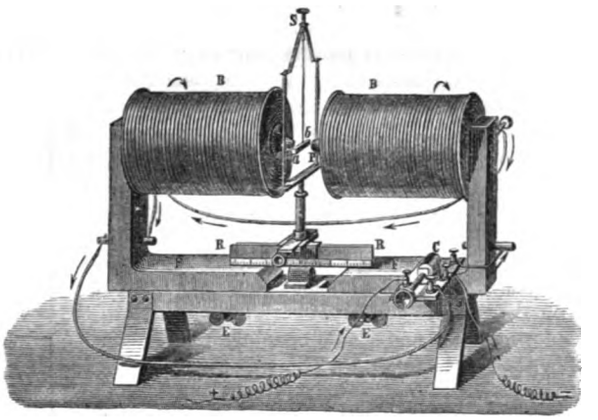
ACTION OF MAGNETISM ON ALL BODIES.

It has long been known that iron and steel were not the only substances which could be acted on by magnetism. Nickel and cobalt especially were known to be attracted by a magnet, though very much more feebly than iron, while bismuth and antimony were repelled. Faraday, by means of a powerful electro-magnet, showed that all, or nearly all, substances in nature, whether solid, liquid, or gaseous, were susceptible of magnetic influence, and that they could all be arranged in one or the other of two classes, characterized by opposite qualities. This opposition of quality is manifested in two ways :

1. As regards attraction and repulsion, iron and other *paramagnetic* bodies are attracted by either pole of a magnet, or, more generally, they tend to move from places of weaker to places of stronger force. On the other hand, bismuth and other *diamagnetic* bodies are repelled by either pole of a magnet, and in general tend to move from places of stronger to places of weaker force.

2. As regards orientation, a paramagnetic body, when suspended between the poles of a magnet, tends to set *axially;* that is to say, tends to place its length along the line joining the poles, or, more generally, when placed in any magnetic field, tends to place its length along the lines of force. Hence the name *para*magnetic. A *dia*magnetic body, on the other hand, when suspended between the poles, sets *equatorially;* that is to say, places its length at right angles to the line joining the poles, or, more generally, tends to place its length at right angles to magnetic lines of force.

The accompanying cut represents the apparatus commonly employed for experiments on this subject. B, B are two large coils of stout copper wire, wound on massive hollow cylinders of soft iron. These latter form portions of the heavy frames, F, F, which can be slid to or from each other, and fixed firmly at any distance by means of the screws, E, E. The armatures, P, which can be screwed on or off, have the form of rounded cones, and produce a great concentration of force at their extremities.



The action of magnetism upon a solid can be examined by suspending a small bar of it *a b*, by means of a special support R S, between the poles P. When a current is passed through the coils, the bar immediately exhibits a preference either for the axial or the equatorial position. Attraction and repulsion are most easily tested by suspending a small ball of the substance at the level of the central line of poles, but a little beside it, the poles having first been brought very near together. On passing the current through the coil, the ball will move inwards towards the lines of poles if paramagnetic, and outwards if diamagnetic.

It is important, however, to remark, that experiments of this kind, unless performed *in vacuo*, are merely differential—they merely indicate that the suspended body is, in the one case, more paramagnetic or less diamagnetic ; in the other case more diamagnetic or less paramagnetic, than the medium in which it moves, the comparison being made between equal volumes. Oxygen is paramagnetic, and nitrogen is nearly or quite indifferent. Air is accordingly paramagnetic, and a body suspended in air appears less paramagnetic or more diamagnetic than it really is. If more feebly paramagnetic than air, it will appear to be diamagnetic. Thus, heated air, in consequence probably of its rarefaction, appears diamagnetic when surrounded by cold air, and the flame of a taper is repelled downwards and outwards from the axial line.

If, on the other hand, the body under examination is suspended in water, it will appear more paramagnetic than it really is, by reason of the diamagnetism of water.

The following metals are paramagnetic : iron, nickel, cobalt, manganese, chromium, titanium, cerium, palladium, platinum, osmium.

The following are diamagnetic : bismuth, antimony, lead, tin, mercury, gold, silver, zinc, copper.

The following substances are also diamagnetic: water, alcohol, flint glass, phosphorus, sulphur, resin, wax, sugar, starch, wood, ivory, beef (whether fresh or dried), blood (whether fresh or dried), leather, apple, bread.

The orientation of crystals in a magnetic field presents some remarkable peculiarities which were extremely perplexing to investigators until Tyndall and Knoblauch discovered the principle on which they depend, This principle is, that crystals are susceptible of magnetic induction to different degrees in different directions. Every crystal (except those belonging to the cubic system) has either one line or one plane along which induction takes place more powerfully than in any other direction ; and it is this line or plane which tends to place itself axially or equatorially according as the crystal is paramagnetic or diamagnetic. The directions of most powerful and least powerful induction are found to be closely related to the optic axes of crystals, and also to their planes of cleavage. When a sphere cut from a crystal is brought near to one pole of a magnet, it is attracted or repelled (according as it is para- or dia-magnetic) with the greatest force when the direction of most powerful induction coincides with the direction of the force.

Directions of unequal induction can be produced artificially in non-crystalline substances by applying pressure. "Bismuth is a brittle metal, and can readily be reduced to a fine powder in a mortar. Let a tea-spoonful of the powdered metal be wetted with gum-water, kneaded into a paste, and made into a little roll, say an inch long and a quarter of an inch across. Hung between the excited poles, it will set itself like a little bar of bismuth—equatorial. Place the roll, protected by bits of pasteboard, within the jaws of a vice, squeeze it flat, and suspend the plate thus formed between the poles. On exciting the magnet the plate will turn, with the energy of a magnetic substance, into the axial position, though its length may be ten times its breadth,

> "Pound a piece of carbonate of iron into fine powder, and ferm it into a roll in the manner described. Hung between the excited poles, it will stand as an ordinary [para] magnetic substance—axial. Squeeze it in a vice, and suspend it edgeways, its position will be immediately reversed. On the development of the magnetic force, the plate thus formed will recoil from the poles, *as if violently repelled*, and take up the equatorial position."*

In these experiments the direction of most powerful induction is a line transverse to the thickness, and this is also the direction in which pressure has been applied. Tyndall accordingly concludes that "if the arrangement of the component particles of any body be such as to present different degrees of proximity in different directions, then the line of closest proximity, other circumstances being equal, will be that chosen by the respective forces for the exhibition of their greatest energy. If the mass be [para]magnetic, this line will stand axial ; if diamagnetic, equatorial."†

A NEW TELEGRAPH INSTRUMENT.

M. G. M. Phelps, of the Western Union Telegraph Company, has recently completed a printing instrument, for the use of the Gold and Stock Telegraph Company, which is really remarkable for its ingenuity and compactness. This instrument works on one line wire, without local batteries, has two type wheels, one for letters and the other for numerals, with a device for shifting the impression instantaneously from one to the other, and is capable of working continually at the rate of forty words per minute. The whole affair is, perhaps, eight inches in diameter, and of about the same height. Mr. Phelps may well take an honest pride in this creation of his mechanical genius, as it is, probably, the most elegant printing instrument ever yet produced. It is probable that this machine will, in time, be exclusively used by the Gold and Stock Telegraph Company for their work, as its speed of transmission is nearly or quite five times as great as the one now in use by them.

* Tyndall on *Diamagnetism*, p. 18. † Ibid, p. 23.

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ON THE BLOCK SYSTEM OF TRAIN SIGNALING.

At a meeting of the Society of Telegraph Engineers, held on Wednesday, April 23, 1873, two papers, "*On the Block System of Working Railway Traffic*," were submitted.

The first paper was by Mr. W. H. PREECE. The author was afraid that electricians would be disappointed at the character of the paper which he was about to read, and that those of the railway world would be affronted at the position which he took in assuming to himself the functions of a mentor. But, in fact, the railway system of this country is as yet far removed from the summit of the engineer's ambition—a perfect working machine, though it is certainly approaching that point. While the carefully prepared statistics of the Board of Trade show that the traffic is increasing with marvellous rapidity, the average number of total accidents is stationary. In the three years ending 1849 the average number of passengers killed, by causes beyond their own control, was 12, being (roughly) one in 4 million passenger journeys made. In the year 1871 the number killed was the same, while the proportion to the passenger journeys made was one in 31 millions. We have in these statistics the most powerful evidence of improved working, and of the beneficial effect of that process of scientific thought which is the application of the lessons taught by past experience to new and different circumstances. The reports of the inspecting officers of the Board of Trade upon the accidents which occur show exactly where the shoe pinches, and favor the application of the law of average in bringing out the defects or merits or variations in railway working.

Dangerous modes of working are frequently carried on for long periods without accident, but they invariably break down at last. One railway company may use an imperfect system for many years without accident, but, if twelve different companies adopt the same system, the probability is that before many months elapse something will show a defect which requires to be cured. The published reports of the Board of Trade furnish experimental data from which a pure science of railway working can be formed. A careful examination of 138 accidents which were reported upon has enabled the author to summarise the causes of accidents into four heads. Those due to defective permanent way have formed 18 per cent.; those due to defective rolling stock, 13 per cent.; those due to defective human machinery, 41 per cent.; those due to defective signaling arrangements, 28 per cent. Of these accidents, 56 per cent. were the effect of collision always preventible.

Now, the question naturally arises, why should there be such a wide difference in the safety of trains traveling upon the southern lines as compared with the northern lines? Is it that the elements of accident are more abundant in the latter than in the former; that the traffic is more crowded; that there is a greater variation in the character of the trains; and that the speed is higher? Or is it that the systems are more lax, and that the accommodation is more defective? The author cannot answer these questions; but there is one fact strikingly evidenced on the southern lines as compared with the northern lines, namely, that upon the southern lines the block system is carried out in its entirety to a greater extent than upon the northern lines. Of the 16,000 miles of railway in the United Kingdom only about 4,000 are worked upon the much-talked-of block system. Now, what is the block system? It is that system by which trains are kept apart, upon the same line or rails, by a certain and invariable interval of space, instead of by an uncertain and variable interval of time. The term "block" itself is a most unfortunate one. It was introduced in the early days, through the practice of blocking or pinning over the telegraph needle in the early instruments used to work this system. The "*space* system," in opposition to the "*time* system," would have been far more appropriate. The practice under the time system is to exhibit the danger signal for five minutes, and the caution signal for five minutes more, after a train or engine has passed any station, junction, level, crossing or siding. Trains are thus kept apart by fixed periods of five minutes, and, if the caution signal were more properly regarded, they would be kept apart by an interval of time even longer than this. The speed of a train is entirely the responsibility of the driver. Immunity from accident is dependent upon his keeping a clear look-out. If engines ran at regular and fixed speeds, if the driver could always insure a good view before him, and if the signals were near together and were properly regarded, a rigid interval of time might be maintained between following trains. But none of these elements of safety are constant. Fast expresses follow slow goods trains, now through a thick fog, and then in bright sunshine. Trains are so frequent in some places, that the interval cannot be adhered to; obstructions to view arise from curves and cuttings, and atmospheric causes; long lengths of line are unprotected by signals, and signals themselves are frequently neglected. Hence the time system is brimful of elements of danger, and the inexorable logic of facts has shown that the time interval is illusory, and the system unsafe. When trains are invariably kept apart by an interval of one or two miles, collision between them becomes impossible. This is the block system. This system has very improperly been divided into two classes—the "absolute" block and the "permissive" block. The absolute block is the block system proper. The permissive block is not a block system at all, but a system introduced by the London and North Western Railway Company, at the suggestion of Mr. Edwin Clark, not to secure the safety of their trains, but to increase the capacity of their line for the transmission of their enormous and increasing traffic. It is, doubtless, an improvement on the time system, but it bears little affinity to the block system, and should certainly not be included in the same category. There is a very broad distinction between the block system, as an abstract principle, and the means of carrying out that principle. We hear of Tyer's, of Walker's, of Spangaletti's, of the needle, and of other block systems. They are *not* block systems, but simply instruments devised to carry out the electrical portion of the block principle. The carrying out of the block system means an entire re-arrangement of the rules and regulations of the working traffic, a complete re-organization of the signals, the construction of fresh siding accommodation, the education of the staff, the transference of much responsibility from the drivers to the signalmen. Moreover, the working of the block system is not necessarily an electrical question. If the sections of the line be very short, it can be worked by mechanical or by pneumatic agency, and, where the sections are long and the trains are few, it can be worked by a staff. On busy occasions, when the trains are numerous, it is quite possible to work the block by ocular agency, by merely planting men within sight of each other, to regulate the trains by flags and other means. The time system having been proved to be inefficient, and the block system having been shown to be the safer principle, how is it that the adoption of the block system in this country has been so slow? People as a rule are very sceptical of any new invention until it has been practically established for a long period, and particularly so when it is based upon principles which are not understood. It took the public a very long time to get used to railways, and it took railway authorites a much longer time to get used to the telegraph. Even now the telegraph is looked upon as an expensive auxiliary, bringing in no returns; or, at least, this was the case before the transfer to the Government. The accidents it has prevented and the lives it has saved are unknown. It is the last thing thought of in the construction of a line: it is the very first thing flown to in moments of danger and difficulty. But its principles are not understood; and the application of electricity to signaling purposes is still less apprehended. On the London and South Western the first outlay in the construction of the block was £125 per mile, The annual cost of maintenance is £60 a mile. On the London, Chatham and Dover the first cost was £174 a mile; the annual maintenance £60 a mile. On the Midland line the annual cost is between £30 and £40 a mile on the main line between London and Bedford, according to returns furnished to the Board of Trade, but this sum probably referred only to the electrical portion of the system. The South Western figures, probably, more nearly represent the total cost of maintenance. The electrical appliances form but a small item of the cost of the total block system, the expense being chiefly due to the signal boxes, interlocking apparatus, and other accessories. But in addition to the question of cost which has delayed its introduction, there is a certain amount of prejudice against its working. It is said to introduce delay, and to be objectionable, because it removes the responsibility from the driver to the signalman. Experience had shown that, under proper regulations, there is not only an absence of delay, but absolute expedition in working, with the block system, and that the capacity of a line for the conveyance of trains is largely increased thereby. And, as regards the responsibility of the driver, this had, if anything, been increased, for the correct working of the block depends essentially upon the driver paying proper regard to the signals. But, in addition to this, the block system has instilled into the driver an amount of confidence which he never felt before, and checked that daring recklessness that was at one time so prevalent. Thus prejudice, cost, and indifference, have led to the neglect of the block system. These objections are, however, rapidly dying out, and most of our great railway companies are now largely extending the block. In the external visual signals uniformity should be secured. The author is far from advocating the block system as the cure for every evil. We know well that where we are dependant upon human agency mistakes will arise; and various defects in connection with the permanent way and rolling stock might be a cause of accident. But the author contends that a compulsory block system would cause other improvements to follow in its wake.

The second paper, on the same subject, was read by Major Mallock. The author was lately ordered by the Government of India to report on the use of the telegraph in connection with railways in England, and the paper contained some of the results which he had arrived at in pursuance of that order. The block system, as used in England, is chiefly applied to double lines, and may be distinguished by the general name of the non-following block, in contradistinction to the non-meeting block which is necessary on single lines. There are various methods of carrying out the block system, any one

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of which, looked at by itself, is apparently perfect, but to choose between them it is necessary to know what is really required. No rules on the subject have been issued by the Board of Trade. There are seven main classes of instruments now used with the block system. There are also variations of them, but these all depend on the main classes. There is, first, a double needle instrument, combining a bell, introduced by Mr. Edwin Clark on the London and North Western Railway, in 1854; second, electro-magnetic semaphores combined with bells, introduced by Mr. Preece in 1862; third, variations of Clark's needles and bells, introduced by Spangoletti in 1862; fourth, the working of bells alone, introduced by Walker on the South Western Railway in 1861; fifth, an electro-magnetic semaphore combined with bells, introduced by Mr. Walker in 1866; sixth, two indices combined with a bell, introduced by Tyer in 1869; and, seventh, a modification, introduced in 1872, of Preece's original instrument of 1866. The first three of these instruments are usually called three-wire systems, and are worked by a permanent current. They require one wire for each line of rails, *plus* one wire for the bell. The last four are called one-wire systems, and are worked by a temporary current. A needle instrument of any sort permits of talking, and is otherwise dangerous. At first sight needle instruments seem so cheap, and so easy to understand and repair, that a person not acquainted with the subject would be apt to prefer them, but there are in connection with them certain imperfections and dangers. The theory of working them is, that a constant positive current kept on the line by the commutator being pinned over will show the line blocked, whilst a negative current shows the line clear, or *vice versa*. In actual practice, however, line clear is only signalled on the train arriving, and then the needle is allowed to fall to zero, the result being that, should the needle be pinned over and the line blocked, the needle will fall to zero. The theory is that a man ought not to consider the line clear unless he has had a call on the bell, or the needle be put over to line clear until he has answered. It will be readily seen how easy it is in practice, when a man is hurried, for him to make a mistake. The Board of Trade inspectors have expressed their opinion that a talking instrument is most necessary, but still it is only as an adjunct to the block system. A flash of lightning may reverse the magnetism of the needle instrument so that it will show "line clear" when it is meant that the line is blocked. Of the one-wire system there is no use in contemplating. Walker's bell without indices, when the introduction of the latter is a great safeguard and not much expense. In Tyer's instruments the workmanship is exceedingly good, and they are apparently the most sensitive instruments, and calculated to work the longest distances, but, like needle instruments, they are liable to have reverse signals given on them by atmospheric electricity. Also the plungers, which give the signals "Line clear" and "Train on line," are so much alike that they may be mistaken by a man in a hurry. Walker's instrument is strong, but possesses somewhat similar disadvantages. In Preece's instrument (worked by a single wire) the commutator which charges the signals "Train on line" and "Line clear" is a miniature semaphore lever, and therefore there is much less chance of mistake than with the other instruments. It also admits of interlocking, like Varley's system. In consequence of a recent addition, the signal "Line clear" cannot be given unless both sender and receiver are concerned in making it, and therefore atmospheric currents will cause no mistake. The single-wire systems are generally used for the non-following block; but where there is a single line of railway, and the non-meeting block is used, the rule is that no second train goes into the same section in either direction. In India, however, they got into a complication with single lines which is not contemplated by either of these systems, namely, that the line being blocked ahead with trains going up, any number may go down it. That is the permissive block system. If absolute block is to be introduced in India, either this plan must be prohibited, or they must provide for a non-following block *plus* a non-meeting block. The author proposes to do this by two wires:—

$$A \left\{ \begin{array}{l} -B-C-D- \\ \_\_\_\_\_ \end{array} \right\}$$

Looking upon A and E as two sidings, and B, C, D as cabins between them, the lower line of the diagram would be a non-meeting block, whilst the lines between the cabins would be a non-following block. The manager of the South Western Railway has said that such a system combined with a train register would be perfect. The paper then gave some particulars of a conference of railway managers and others, held at Berlin on the 1st of December, 1870, with reference to the block system, and detailed a series of principles which were adopted at that conference. The author concluded with a series of twenty-four rules, which he had deduced from his investigations as to the working of the block system in England, and which coincided with the spirit of the principles laid down by the German Conference, but were somewhat more comprehensive. The rules so laid down by the author consisted of a series of affirmations to the following effect:—The block system entails no loss of time, but, on the contrary, enables a far greater traffic to be carried on. It is essential to the safe working of a line. The system of the "permissive" block is most dangerous. It is of no use to establish a block system if the sections are too short for a train going at full speed to stop in, or if a slack method of working be permitted. Any station at which shunting is or may be carried on must be guarded by the block. A private code of signals between the men must not be allowed. Whatever system of block is introduced, a train register is wanted. On dangerous sections a train should report back its own arrival. Besides block instruments, talking instruments should be provided, and these must not be interposed in circuit with others, but each section must work separately. On exceptional sections the block instruments should interlock with the semaphore levers. "Line clear" should not be signalled back until the tail-board of a train is seen, lest any of the carriages should be left on the line. The line staff has proved inoperative without the assistance of the telegraph. Electric repeaters are required. The block system is as necessary with light as with heavy traffic. Where a bell-code is in use, a large number of beats is liable to lead to confusion. Needle instruments which can be used for talking are objectionable as block instruments. It should be impossible to show "Line clear" unless the signalmen at both ends are concerned in making the signal. Plungers, such as those of Tyer and Walker, which may be mistaken in the hurry of working, are dangerous. At the junction of two lines the block instrument should interlock on the principle of Saxby and Farmer's interlocking semaphore levers, so that "Line clear" cannot be telegraphed to both sections at the same time. Exceedingly simple instruments are desirable. The working of the block instrument should approximate as much as possible to the working of the outside semaphore. A single-wire system, working with a temporary current, cannot be considered perfect if lightning can reverse the current or demagnetise the instrument. The receiver must not be able to alter the index of incoming signals at his station.

After the reading of the papers, Mr. W. H. Preece described a collection of electrical signalling instruments, which had been devised from time to time for use in connection with railway traffic.

THE CINCINNATI INDUSTRIAL EXPOSITION OF 1873.

We have received advance copies of the rules and premium list of the Fourth Cincinnati Industrial Exposition, issued in a style in keeping with the character of the Exposition itself. From this it appears that the Exposition will open to the public on Wednesday, September 3, and will continue until Saturday, October 4, 1873.

The halls and grounds will be open for the reception of articles from Monday, August 4, to Saturday, August 30. All articles will be entered for exhibition only, except those specifically named in the published list of articles to which premiums will be awarded.

The exhibitor may choose before August 30, to enter articles for exhibition only which are in the premium list, but all applications for space must be made on or before the 20th day of August, on the printed blank forms, which will be furnished by the Secretary; and applicants after that date will not be allotted space until those entered by the 20th of August have been assigned.

Articles for competition must be of American manufacture, and entered by the manufacturer or his agent, excepting those otherwise stated in the premium list, and all premiums awarded will be for first degree of merit only.

The following is the list of premiums offered for electrical and telegraphic machinery:

Best Electric Engine, Motor for Light Work	Silver Medal.
Best System of Fire Alarm Telegraph (in operation)	Gold Medal.
Best Adaptation of the Telegraph to Domestic Use	Silver Medal.
Best System of Telegraphic Railway Signals	"
" Fire Alarm Signal-box	"
" Telegraph Instrument for Stock Quotations	"
Best Set of Instruments for Electrical Measurement	"
Best Telegraph Battery for Force, Durability and Economy	"
Best Electric Light	"
" Ship Telegraph (Electric or Pneumatic)	"
" Hotel Annunciator operated by Electricity	Bronze Medal.
" Combination of Morse Telegraphic Instruments	"
Best Box Relay with Key attached	"
" Pocket Relay Magnet	"
" Morse Register	"
" Single Cut-out	"
" Best Switch for from four to twenty Wires	"
" Telegraph Sounder	"
" " Key	"
" Electro-magnetic Motor	"
" Magnetic Watchman's Clock	"
" Dial Telegraph Instrument	"
" Lightning Rod	"

The officers of the Board of Commissioners are as follows:

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First Vice-President—D. B. Pierson.
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CORRESPONDENCE.

WILL IT PAY?

To the Editor of the Journal of the Telegraph:

Although much has been said on both sides of this new alphabet question, there appears to have been much left unsaid.

Many operators seem to fear that a change of alphabet, more or less sweeping, will be hastily made.

To this class I would say, the question is, simply, will it pay?

The Western Union Telegraph, with its immense and rapidly increasing influence, carries with it, at each step, equally immense responsibilities, which it can neither throw off nor ignore.

The managers of the W. U. Co. are in every sense *self-made men*, and from that class of people we have little to fear from hasty or ill-considered action.

President Orton, whose pen so completely riddled "Postal Telegraphy" and its advocates, and whose clear, far-reaching policy of lowering tariffs, increasing facilities in every way, improving the quality of all supplies furnished, &c., has so effectually screwed down the lid of its coffin, will never allow the change until he is satisfied it will pay.

Three of our General Superintendents I have had the honor of knowing personally more than twenty years. They rose from the operating ranks, not by friends or influence, but as the legitimate result of much careful, thoughtful and steady application to the duties entrusted to them. In other words, by brains.

Not one of them will lend his influence to this change until mature thought has shown it to be of real advantage, in which case we all want it. Whether the telegraph alphabet is the same the world over, or not, an American invention, or whether "Americans must rule America," telegraphically or not, are points more fitting for Fourth of July orations than a place in this discussion.

Write this contemplated change, up or down, as you will, the bottom of the Western Union's crucible will invariably and rightly show these questions?

What will we gain?

What will it cost?

Can we accomplish the object cheaper?

The answer to number one is understood to be lessened liability of errors.

To answer the second question is more difficult.

Our operators use the present alphabet intuitively, giving no thought to formation of the letters, but giving their attention (and it is needed) to other details.

The name of the State messages are from, or going to, correct timing, counting the words, watching the hooks that extra important, or death messages, may be rushed ahead, reading carefully the messages or reports being handled, to discover any error previously made, &c., occupy their time—the whole of it. I think experience would show it expensive to oblige him, in addition to all this, to note carefully the alphabetical changes.

Habits are strong. Witness a foreigner, in excited conversation, or rapid letter writing. Years do not break *his* habits. The old country sentence or word slips in without notice. Will it be easier for a tired and hurried operator to remember his new alphabet? This refers more particularly to our first-class operators.

Now take a small office. The operator is ordinarily railroad agent and express agent; often having other duties still. His telegraph receipts run anywhere from $8 or $10 upward per month, but an error in any message he handles will result as expensively as if made in some large office.

The company cannot, of course, afford a first-class operator there, but he is a reliable, steady, industrious man, who for months practiced hard to learn telegraphing to gain just such a position.

He is expected to, at the same time, sell tickets, check baggage, receive or deliver express packages, and, perhaps, at that very moment is receiving a train order or telegram.

Is it wise to change the alphabet on him? Has he not already sufficient to think of? If, in his perplexity, he makes an expensive error, who foots the bill?

A careful perusal of most of our contracts with railroad companies will add interest to this question.

This is no exaggerated case, for we are doing business with thousands of similar ones every day.

Should the error occur in a train order, and loss of life result, who would foot *that* bill and stand responsibile for the changed alphabet?

To me it certainly seems the risks are greater than the prospective gain. Again, is there no other way to reach this lessened liability of errors? This brings us to the third question, and I unhesitatingly claim that there is a *cheaper* and *more effective* way, viz: by discouraging too rapid telegraphing, and encouraging more care in doing it.

I claim, further, that from the time the JOURNAL published the records of the fastest Morse telegraphing known, complimenting the performers so highly, congratulating the Company in having such operators in their employ, and, in fact, endorsing all attempts to rival them, until now more errors have resulted from attempting to write and receive faster than, in each case, could be done *safely*, than from all errors in spaced or unspaced letters aside from the fast operating mania.

"Way" operators, of comparatively limited experience, reading those articles, and thinking the chief end of (a telegraph) man is to write and receive rapidly, tries it on. He rushes business to some one of even less experience, and after worrying him sufficiently, seats himself and *waits* to get two, or three, or more messages to send together again. Meantime, some old head, hearing and understanding the case, gives *him* a *dose* that nearly takes his breath away. But he is too proud to "break." He answers O K, as coolly as if he had the entire message down, words counted, timed, &c., when, in reality, he is several words behind the signature. He then tries to complete it from memory, and often succeeds, but what are the chances?

Any old-time operator will recognize this picture. If you doubt it, Mr. Editor, ask him. After that, ask yourself if you can afford to encourage it?

The plea that extremely rapid telegraphing is *necessary*, will not do. Moderately fast writing, always evenly spaced, and each letter distinctly formed, will do as much, or more, work in one hour, or ten, will leave no room for errors, and will be an every day model for younger operators to aim to equal.

At the risk of being considered "old fogyish," and a "slow coach" for the age, I have given you the convictions resulting from about twenty-five years telegraphing, and part of it spent in going through this same rapid writing mill. I claim that our system is all right, and our alphabet all right, every letter and every figure *with care*, and that *without* it no system or alphabet is safe. B.

BOSTON, June 23, 1873.

To the Editor of the Journal of the Telegraph:

Judging from the liberal amount of space which the JOURNAL allots in each issue to correspondents on the subject of changing the present Morse alphabet for the "Continental," it is evident that the Western Union Company desires to hear the frank and outspoken opinions of its employees throughout the country. I do not attempt to speak for my associates, but only for myself, when I say that I do not believe that this change will meet with very strong opposition, should it be decided upon. A much more radical change was made a few years ago in Supt. G. W. Gates' district, on the old Vermont and Boston lines. The Bain alphabet had been in use on those lines for years; and if any of your readers will compare the Bain and the Morse signals, a glance will show them what a task it was on the "old sogers" to change. One of your correspondents complains that confusion will arise in making — · — · for C, and · — · for R, in the new system. But what would he say, had he been accustomed all his telegraphic lifetime to read · · — for D; · — · for B; · · · for C; — · · for G; · · · · for L; and so on, if he were told to prepare, within a certain time, to read those same characters for U; F; S; X; and H? Of course the change will cause temporary inconvenience to many; but I doubt if any operator will admit that it will take *him* long to master these difficulties. In fact, some of your correspondents seem to desire to create the impression that they are not speaking for themselves, but for "those dreadful 'plugs' out of town."

Now, this is all nonsense. But, on the other hand, I do not believe the simple getting rid of spaced letters will save the Company from losses on account of mistakes.

Quite as many mistakes are made with the other characters. The "artist" who impatiently told an old operator to "frite gerse" has many imitators in the profession; and no alphabet in Christendom can improve the *key*-rography of these gentlemen. No doubt the managers of the company will examine the subject thoroughly, and consider well all its advantages and disadvantages before they decide upon a change. Some of your correspondents object to the new alphabet on account of its being "longer" than the present one.

Some years ago a friend of mine took the trouble to write a thousand words from a discourse, in both alphabets, and then counted the dots and dashes. I have forgotten the result of his calculation, but the difference was not very great.

Speaking of loss of time, allow me to call your attention to an every day nuisance.

A long message is to be sent. Transmitting operator says: "here's a long one has — words in it." Here is a waste of time, counterbalanced perhaps by the more even "copy" of the receiver; but the same result would be reached if the check were sent at the beginning of the message with the number, as is done on the cable circuits.

Perhaps the operator does not say how long the message is, or, worse still, says nothing at all; and a straggling copy is the result, with perhaps one or two words, or only the signature on the other side of the blank; reproaches, mild and otherwise, follow; perhaps the message has to be repeated, and a minute or two is lost.

All this would be avoided were the check sent before the date. One or two other suggestions I would like to offer, but I must not abuse my privilege in your columns. SHAWMUT.

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TALLAHASSEE, FLORIDA, June 18th, 1873.

To the Editor of the Journal of the Telegraph:

Much has been said and written of late in regard to the proposed change of alphabet, and presuming you would like to have a free expression of opinion upon the subject, even from points as remote as this, I would say that, as far as I have heard among telegraph men in this State, the proposition to change our alphabet, which originated in the grandest brain among modern scientific men—the glorious Morse—for the interminable, ear-killing combination known as the European or International alphabet, meets with unqualified condemnation. The fault is not in the system, but the men, and it will be a sad day for our craft in America when the musical rhythm of the old Morse alphabet is heard no more in the telegraph offices of our country. We sincerely hope no change will be made. My experience is that as many "bulls" are perpetrated with the dotted letters as are from the too-much abused spaced letters. Without encroaching upon your space, allow me to make a suggestion: Every operator has, doubtless, been a witness to, or is aware of, painful and affecting scenes resulting from the delivery of messages containing the announcement of the death of some relative or friend of the party addressed. Now, Mr. Editor, do you not think it would be well to supply each office with mourning blanks and envelopes, gotten up, and to be used only for death messages? In my humble opinion many a cruel surprise would thus be avoided, and a party receiving such a telegram could tell at once, from the envelope, the nature of its contents, and be in some measure prepared for the shock which such intelligence always brings with it. "K."

To the Editor of the Journal of the Telegraph:

To-day a party called here, and wrote a message for a party in B., and in it requested an answer by boy. We requested him to advance money to cover cost of answer, which he refused to do, saying it was Co.'s fault if he did not get an answer by a reasonable time. He moreover proposed to act as judge as to what time it ought to come, and tendered the money to pay for the message he proposed sending. The party was a stranger and a transient. The course we pursued was, we sent the message which he paid for, and notified B. office we would not be responsible for the tolls on the answer. Did we do right, or should we have refused the message?

WEVERTON, MD.

Answer.—You acted right in the course you pursued. Telegraph companies cannot refuse to transmit any message couched in proper language, and for which payment is tendered. Managers should always bear in mind that, in their business relations with the public, they represent the Company, and no matter how unreasonable a customer may be, he should be treated with courtesy and politeness, and the rules of the service applicable to his case explained to him.

LOGANSPORT, IND., June 16, 1873.

To the Editor of the Journal of the Telegraph:

We received a death message, on 13th, for the battery man of railroad office in this place. We were not acquainted with him, but, after inquiring at the post-office, hotels and places where he would likely be known, we were told by some party on the street that he was employed by the railroad company, but did not know in what capacity, nor if he was a family resident of the city. Our boy took the message to his place of business, and was told that party was out of town, but expected home at any time. We left the message on his hook, where all business for him is delivered. But to-day the party appears, and very furiously accuses us of neglecting our duty; claiming that, being a man of family, the message should have been delivered to his house, and not to his place of business, and where our judgment led us to believe he would get it quickest. He refuses to refer it to our superintendent, but insists on making as great a fuss about it as if he was the worst used man in creation. We contend that our duty was performed, not knowing him to be a man of family, in delivering it to his place of business. Please answer us.

J. E. FRIEND, Manager.

Answer.—You should not have left the message without obtaining a receipt therefor. You should have filled out a No. 26 blank, and left it at his place of business, instead of leaving the message. Otherwise, you seem to have done all that was possible.

To the Editor of the Journal of the Telegraph:

The following appears in issue of June 2d:

Talladega.—There are thirteen words in the following:

"Send mail. Am much improved in health. How are all?

C. P.

Imperial Hotel. Answer."

In above instance you count address of the sender and his request for reply as a part of the message. We do not know of any rules governing this case, but the universal custom has been that such information is transmitted with the message, but *not* counted in check, as in the case of sender putting his title underneath signature, such as Gen'l Supt., Vice-President, Business Manager, et cetera. Please inform us the ground on which you decide as above.

NEW ORLEANS.

Answer.—The decision quoted is based upon justice to the telegraph company. Usage allows the date, address and signature of a message to pass free. If the sender of a message desiree that his place of business or his residence be made known to his correspondent, he should pay for it. Also as to his official title. If he does not wish it transmitted he should so inform the receiver, in which case it should not be counted or charged for.

ST. ALBANS, VT., June 24, 1873.

To the Editor of the Journal of the Telegraph:

Please inform us through the JOURNAL how many words should be counted in the following message: "Send three mowers to St. Armand Station, P Q; three Abercorn Station, P Q. Reply."

St. Armand, Abercorn, and Abercorn Station, are all offices on the Montreal Tel. Co.'s line. Please answer in detail. OPERATOR.

Answer.—It would appear that the question at issue is the counting of St. Armand Station and Abercorn Station. If these are the names of places distinct from St. Armand and Abercorn, they should be counted one word each. If the station in each case is a *thing* situate in the places bearing these names, they should be counted according to the number of distinct words. In the first case there would be ten words; in the second, thirteen. P. Q. is one word in both cases.

CINCINNATI, June 20, 1873.

To the Editor of the Journal of the Telegraph:

Are you not a little awry in your "Union 76" decision in JOURNAL of June 16th, page 213?

How would it be if the sender should leave his name off entirely? I think we are in a measure bound to transmit free after a signature such simple designation as "Master" (applied to the captain of a vessel), Agent, Prest., Supt., Cashr., Secy., &c. In the case named I would transmit free the word "Sec'y," and charge for the remainder.

Here is another phase of the same question: A party brings to an office a message dated "On Board Steamer Equinox, Portsmouth, O., June 20th, 1873." How much of the above are we bound to transmit free? I would say apply the same rules as in counting extra words after signature, and in the case named, charge for four words in address.

GEO. T. WILLIAMS.

Answer.—A telegraph company is in no sense bound to transmit free any affix or prefix to a signature or date, and only so much in an address as may be necessary to find the party, and then only for reasons of their own, which are evident. Many abuses have crept into the business which it is time to stop, and this is one of them. In the instance given, the four words "On board steamer Equinox" should be charged for as part of the message. There is no good reason why such information should be transmitted free of cost to the sender, nor should his official title, place of business or residence be given at an expense to the company.

COLUMBUS, O., June 21st, 1873.

To the Editor of the Journal of the Telegraph:

How many words should check to the following call for: To A. J. Johnson, H. M. White, or J. Q. Smith, care B. J. Loomis, Cincinnati, O. Where is the steamer Ohio number 4? When will she start on return trip? CHAS. W. ROSS.

Answer.—There are twenty-one words.

W. B. Barrow.—The International alphabet can be found in the JOURNAL of April 1, 1873.

X.—In counting figures in duplication of words, the figures are to be considered as the same in number as the words expressing them. In the sentence "one hundred and thirty-four" there are five words; if duplicated in figures there would be five additional. Figures are to be counted for exactly as many words as may be used in expressing them. We have answered substantially the same question many times during the past few months.

E. S. W.—When a customer sends a message and does not receive a reply as soon as he expects, you are not *obliged* to send an official message requesting an answer. But, at the same time, you are expected to use the greatest politeness and courtesy to the party, making proper explanations discreetly. See our editorial pages, issue of June 2, 1873.

E. O. Wait.—Your paper is plainly addressed to Clinton, Iowa.

H. I.—The number of cells of Hill's battery, requisite to work a line one mile long, depends upon the number and sensitiveness of the receiving instruments employed. The line could be worked with one cell, and might need a dozen.

G. H.—A printing telegraph system allowing double transmission with terminal or way offices, which is simple, practical, and not too costly, would be valuable, and without doubt would be favorably received, even if its speed was limited to 1,400 words per hour, each way. The cores of a magnet are usually made proportional to the length of wire in the coils. When this is the case, and the core is fully saturated with magnetism, nothing in power or strength of attraction would be gained by increasing the surface of the end of the core or using a wider armature.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
July 1, 1873.

To all Offices on W. U. Lines:

State Rates will be adopted by Offices in the following named States:

Between New Hampshire and Georgia - - $2 00

Between Indiana and Cape Breton, Nova Scotia and New Brunswick, - - 2 00

Between Michigan and Cape Breton, Nova Scotia and New Brunswick - - 2 00

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Salt Creek, Ala., changed to Alabama Furnace.

Alameda, Cal., re-opened.

Blue Canon, Cal., re-opened. "Tariff for Other Lines," 60 30 from Sacramento, Cal., or Reno, Nev.

Lincoln, Cal., closed.

Menlo Park, Cal., re-opened as an Other Line Office. "Tariff for Other Lines" 50 25 from San Francisco, Cal.

Mountain View, Cal., re-opened. "Tariff for Other Lines," 50 25 from San Francisco.

New Castle, Cal., re-opened. "Tariff for Other Lines," 50 25 from Sacramento.

Roseville, Cal., re-opened. "Tariff for Other Lines," 30 10 from Sacramento.

Wheatland, Cal., re-opened. "Tariff for Other Lines," 50 25 from Sacramento.

Malad, Idaho, closed.

Concord, Ill., closed.

Garden Plain, Ill., closed.

Lovejoy, Iroquois Co., Ill., changed to Wellington.

Tunnel, Ill., closed.

Houlton, Me., is now a W. Union office. Tariff 25 cents more than Woodstock, N. B. Check direct.

Kingston, Md., closed.

Westover, Md., re-opened.

Business for the following Other Line Offices in Maryland, published in last JOURNAL, may also be sent via Point of Rocks, Md. "Tariff for Other Lines" same as via Washington, D. C.:

Boyds,
Rockville,
Tuscarora,
Silver Springs.

Brooklyn, Mich., closed.

Ocean Grove, N. J., is now a W. Union office; square 47. Check direct.

Business for Old Bridge and Newtown, N. J., will hereafter be checked direct.

Buffalo Plains, N. Y., closed.

Catskill Mountain House, Cornwall, N. Y., re-opened.

Lake George, N. Y., re-opened.

Chittenango Springs, N. Y., re-opened.

Millport, N.Y., is now a W. U. office; square 83, check direct.

Messages for Tottenville, S. I., N. Y., may be taken and delivered from Perth Amboy, N. J.; charges for delivery, twenty-five cents.

Offices in squares 1 to 40, inclusive, and 45 and 46, which have heretofore computed rates to points on Long Island, in squares 29, 33 and 41, by adding fifteen cents to their rate to square 41, will hereafter charge for same points the rate to square 33. The following is a list of the L. I. offices referred to:

Babylon,	Mineola,
Bay Shore,	Northport Depot,
Brentwood,	Penataquit,
Flushing,	River Head,
Greenport,	Sag Harbor,
Hicksville,	Shelter Island,
Huntington Depot,	Glen Cove,
Jamaica,	Roslyn,
Manor,	Oyster Bay,
Mattituck,	East Hampton.

Cresson Springs, Pa., re-opened.

Chester Heights, Pa., re-opened; square 59.

Business for Tacony, Pa., will hereafter be checked direct.

Rocky Point, R. I., re-opened; tariff same as heretofore.

Yellow Sulphur Springs, Va., re-opened.

Montgomery White Sulphur Springs, Va., re-opened.

Hereafter the "Tariff for Other Lines" from Richmond, Va., to points in Virginia, given below, will be as follows:

Alleghany,	40	3	Hanover Junc,,	30	2
Beaver Dam,	30	2	Louisa, C. H.	40	3
Covington,	40	3	Millboro,	40	3
Frederick's Hall,	30	2	Elizabeth Furnace,	40	3
Greenwood,	40	3	Jackson River,	40	3
Hanover, C. H.,	25	2	Keswick,	40	3

NEW OFFICES.

276 Alabama Furnace, Ala.
295 Georgiana, Ala.
294 Ironton, "
304 Planterville, "
553 Divide, Col.
578 Black Rock, Idaho.
318 Hervey City, Ill.
298 Monee, Ill.
310 Omaha, "
329 Sanborn, Ill.
308 Wellington, Ill.
289 Hillsboro, Ind.
356 Gordon's Ferry, Iowa.
356 Waupaton, Iowa.
466 Hartford, Ks.
* Barnsville, Md., 20 1 { 77 Washington, D. C. / 85 Point of Rocks, Md.
148 Rifle Lumber Boom, Mich.
148 Au Gres Lumber Boom, Mich.
342 Stonewall, Miss.
369 St. Paul, Mo.
409 Scotts, Mo.
513 Belvidere, Neb.
516 Georgetown, Neb.
47 Kinkora. N. J.
47 Lewistown, N. J,
83 Crystal Springs, N. Y.
120 Ellicottville, N. Y.
Flatbush, L. I., N. Y., tariff same as Brooklyn.
36 Johnsonville, N. Y.
* Clay Station, N. Y., 25 2 74 Syracuse, N. Y.
213 Buena Vista, O.
131 Everson.
76 Pine Grove, Schuylkill Co., Pa.
112 Sonman, Pa.
47 Torresdale, Pa.
133 Blue Ridge Springs, Va.
511 Palmer, Texas.

Offices having "Special Sheet A" will check Pine Grove, Schuylkill Co., Pa., 25 cents more than "special rate" to Phila. Square rates not to be increased.

Battle Mountain, Ind., in last JOURNAL, should read Battle Ground, and Silver Creek, Md., should read Silver Springs.

ATLANTIC CABLE BUSINESS.

We are informed that on and after July 1, 1873, the rate from London to points given below will be as follows:

	For 20 words or less.
Portugal, via Falmouth....	$2 12
Spain, " "	2 62
Orkney Islands.....	1 50
Shetland "	1 75

Half-rate for each additional 10 or fraction of 10 words.

WILLIAM ORTON, *President.*

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKNOWLEDGMENTS OF RECIEPTS FOR ASSESSMENTS 42 AND 43, UP TO AND INCLUDING JUNE 24TH.

4	5	15	16	52	53	54	67	69	72	76
77	82	88	91	93	95	99	101	129	133	136
139	146	148	157	176	177	179	183	201	202	213
217	220	228	240	245	254	255	256	274	275	277
278	279	280	281	282	283	285	312	319	322	328
330	332	341	342	344	350	354	367	371	376	378
380	394	402	405	413	416	426	466	467	468	469
470	471	474	475	478	514	520	526	532	533	536
542	552	554	560	565	569	570	574	576	579	586
594	603	605	615	622	636	646	659	661	667	678
679	680	685	690	698	700	708	731	731	741	758
769	775	776	789	797	808	812	820	825	832	848
855	856	870	873	875	883	886	911	912	939	939
941	942	966	976	978	996	1005	1023	1043	1054	1056
1058	1061	1081	1093	1099	1102	1126	1147	1148	1151	1154
1164	1165	1173	1174	1175	1193	1194	1195	1198	1201	1205
1225	1228	1233	1237	1238	1239	1141	1252	1254	1263	1267
1270	1271	1276	1278	1279	1292	1295	1307	1308	1309	1311
1312	1313	1314	1315	1317	1318	1319	1330	1321	1322	1327
1336	1343	1345	1356	1358	1359	1363	1364	1365	1372	1402
1403	1404	1407	1410	1414	1419	1425	1437	1438	1439	1444
1448	1449	1451	1453	1454	1455	1456	1479	1482	1484	1487
1488	1490	1500	1501	1506	1507	1508	1511	1522	1524	1532
1535	1539	1542	1543	1549	1550	1555	1558	1560	1561	1565
1569	1589	1590	1593	1594	1615	1623	1626	1632	1634	1635
1650	1656	1658	1660	1661	1662	1663	1669	1697	1698	1729
1735	1736	1745	1790	1795	1797	1804	1806	1811	1812	1815
1818	1822	1844	1845	1852	1862	1867	1869	1881	1900	1901
1902	1905	1907	1910	1911	1913	1914	1922	1926	1931	1933
1936	1941	1943	1944	1951	1957	1959	1960	1964	1965	1969
1978	1983	1985	1986	1987	1998	1999	2000	2001	2006	2013
2019	2021									

WE are pained to announce the loss of three more members of our Association, viz.: Fred. S. Belden, certificate No. 966, died of consumption, at Whitehall, N. Y., June 10th. He was formerly employed at New Carlisle, Ind.—Theodore Wilcox, certificate No. 1029, died at Chicago, of cerebro spinal menengitis, June 16th. He was manager of the Great Western Telegraph office at that point.—Edward Wade, certificate No. 1545, died of cholera, at Nashville, Tenn., June 17th. He was operator at the St. L. & S. E. R.R. office at that place.

Assessments for these deaths will be issued without delay.

To the Editor of the Journal of the Telegraph:

I understand, from the officers of the Insurance Association, that we have three more deaths, and that they all occurred within a week of each other. They have been coming rather often of late, and no doubt many members will feel that they can ill afford the three dollars to be called for. It was to relieve such that the proposition was made to limit the payments in each case to $1,000, it being understood that all money received in excess of that amount should be used for the purpose of liquidating future assessments. I have no doubt, if properly understood, all would heartily approve of the change.

The objection most frequently urged is that it would be unjust to the old members. This class, however, have had the benefit of the Association by being insured during their whole connection with it. This alone has certainly been worth all it has cost them, and under the new plan, should it be put in operation, they would enjoy the same benefit in a degree proportionate to the amount they will be called on to pay.

Surely, for the sake of their financially less fortunate brethren, if for no other reason, the proposition should be approved. One thousand dollars is as much as such an Association as ours should undertake to pay. It is sufficient in most cases to relieve immediate necessities, and if we do this much we have accomplished all that can reasonably be expected.

Again, it is urged that it would be unjust to the old members, because it admits new members to an equal interest in the reserve fund, which has mainly accumulated from the contributions of those who have long been members. This is true, but it can be easily and satisfactorily adjusted by increasing the initiatory fee, which new applicants will hereafter be obliged to pay, in order to be admitted to membership. The reserve fund now amounts to a little over $1 per member. Let the initiation fee be made $2.50 for the present, and as soon as the reserve fund reaches an amount equal to $2 per member, add another dollar to the fee.

The money value of a membership in the Association is certainly worth more to-day, with our six years' standing, and the reserve fund, which is constantly increasing in amount, than it was in the early existence of the Association, when our plan was but an experiment.

It seems no more than just that this fact should be recognized, and new members be required to pay accordingly.

"OLD MEMBER."

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OBITUARY.

HORACE F. CLARK.

The Hon. Horace F. Clark, a Director of the Western Union Telegraph Company, died at No. 10 East Twenty-second street, at 11:15 P. M. on Thursday, June 19th, of rheumatism of the heart. About May 1, Mr. Clark started for Chicago to attend the annual election of Directors of the Chicago and North-Western Railroad, in which he held a large interest, and he made an extended tour of inspection over the Pacific Railroad and other lines with which he was actively connected, returning to New York on Saturday, May 31. While absent he was taken with an attack of rheumatism, to which he had long been subject, and on reaching home he was quite unwell. The disease gradually became more alarming, compelling him to abstain from business and finally confining him to his house, which he has been unable to leave since Monday of last week. Having frequently before been affected similarly, and being of a natuarlly strong constitution, earnest hopes were even entertained that he would eventually shake off the hold of the disease and recover his health again. The symptoms continued to grow worse, however, and on Tuesday last the affection assumed an unfavorable turn and struck to his heart, when he began to sink gradually, passing away quietly surrounded by various relatives and friends.

Mr. Clark was born in Southbury, Conn., on Nov. 29, 1815, and was consequently in the 58th year of his age.

At a meeting of the Executive Committee of the Western Union Telegraph Company, held on Saturday, June 21, the following preamble and resolutions were unanimously adopted :

" *Whereas*, It has pleased Him, whose ways are not our ways, to take from his friends and from his labors Mr. Horace F. Clark, and we, who have known him well, desire to record on the pages where his name appears so often an expression of sorrow for his loss, as well as our tribute to his various services ; therefore,

Resolved, That we feel that one who has been so long a leader in the material enterprises of his country, and prominent among the chief men of its chief city, needs no recital of his works or his character ; the trusts he was filling, the position he had won, bear testimony weightier than words to an integrity that never was questioned ; to the mental keenness, power and attainments manifested on so many exacting fields; to that broad grasp of the great undertakings of his time which yet, with rare felicity, was associated with exceeding accuracy and mastery of detail, and to that industry which resulte1 alike in his success and in his death.

Resolved, That we wish rather to record here our sense of his wise counsels and unremitting devotion to the interests of this company, our sorrowful recollection of long and pleasant personal intercourse, and our loss of a friend whose fidelity was positive, and who, when he promised support, never wavered or forgot.

Resolved, That we tender our sympathy to the family of our friend, and that this committee will attend his funeral in a body.

A true copy from the minutes.

GEORGE H. MUMFORD, *Secretary*.

The funeral took place on Sunday, June 22, at 4½ P. M. from the Madison avenue Presbyterian Church, the Rev. Dr. Adams, pastor. Delegations from the Western Union Telegraph Company, and from the Directors of the New York Central and Hudson River Railroad Company were present. The pall bearers were Judge William H. Leonard, William M. Evarts, Charles O'Coner, Chester W. Chapin, Charles M. Rapallo, William Orton, John Q. Jones, Richard Schell, Joseph B. Varnum, William Butler Duncan and E. B. Wesley.

The remains were taken by special train from the Grand Central Depot at 6 P. M. to Woodlawn Cemetery.

FOREIGN TELEGRAPHIC ITEMS

SUBMARINE CABLES.

The following is from the monthly circular of Mr. William Abbott, of the London Stock Exchange :

The past month has been an important one in the history of submarine telegraphy, the shareholders of three Atlantic lines having adopted the proposals of the respective boards of those companies for amalgamation by unanimous votes, excepting in the case of the French Cable Company, where a few speculative holders have combined with a view to break down all efforts for consolidation. Consolidation unquestionably will give to these properties additional strength, and this will be by no means agreeable to those who traffic only in adverse fluctuations. These machinations have, happily for the shareholders and for the future development of telegraphy, however, signally failed. Recent interruptions in cable communication have, no doubt to a partial extent, checked confidence in cable securities, but the successful and speedy repair of the French and Singapore lines at a trifling cost has, however, given great encouragement to the proprietors, and leads to the expectation that equal success will attend the operations of the Telegraph Construction Company in recovering and restoring to perfect insulation the 1865 cable of the Anglo-American Company.

Another important feature of the month has been the picking up and repair of the lost cable between Florida and Cuba. This, with the submersion of the new line, gives a duplicate cable for the valuable traffic of the West Indies.

TELEGRAPHIC PROGRESS IN SAN SALVADOR.

The *Official Gazette* of Salvador, May 17, says :— On account of the frequent breakage of telegraph wires, the failure of the batteries, and want of due care on the part of the telegraph operators and watchmen, the system has not yet got in good working order. Certain regulations and penalties have been decreed by the Government. On telegraphic matters, the Minister of the Interior, in his report to the Constituent Assembly of 1873, says that "telegraphs are now spread over the Republic, and doing much good to the country."

The contractor in constructing lines here failed to comply with the terms of his agreement, putting in smaller wire than contracted for. He has received but $24,000 of the $45,000. His claims will be submitted to arbitration.

TELEGRAPH MATTERS IN CHILE.

At a meeting of the directory of the Transandine Telegraph Company, held at Valparaiso, on the 21st of May, it was stated that the business of the company was steadily increasing, and it would soon be possible to declare a dividend,

It was also stated that the Brazilian and Lisbon cable would be laid and opened as far as St. Vincent, Cape de Verde, in September next, and that the construction of the Pernambuco cable would be completed by May, 1874, so that in about one year Chile will be in telegraphic communication with the world.

THE Eastern Telegraph Company's traffic receipts for the month of May, 1873, amounted to £29,852, against £31,707 in the corresponding period of 1872. The deficiency is owing to the recent interruption in the *Extension* Company's line.

THE Danish Government has granted a concession to the Great Northern Telegraph Company to establish submarine telegraphic communication between West Jutland, or Faroe, and France, and between East Jutland and Sweden.

THE Chamber of Commerce of Christchurch, New Zealand, suggests that " the Government should urge upon the Imperial authorities the desirability of the scientific appliances on board the " Challenger" being employed, whilst in these latitudes, to ascertain the best line for a submarine telegraph cable between this colony and the Australian continent."

BEFORE the Queensland and New Zealand delegates left Sydney, a verbal arrangement was made between them and the representative of New South Wales, at the late Intercolonial Conference, respecting telegraphic communication between New South Wales and New Zealand, and between Queensland and Singapore. It is understood that the arrangement was to the effect that the Governments of New South Wales, Queensland and New Zealand should agree to recommend their respective Parliaments to grant a subsidy to cover the interest on the cost of the submarine cables referred to ; each colony to contribute one-third of the total amount payable under the guarantee.

IT is intended to place the chief inland towns of South Africa in telegraphic communication with Cape Town and Port Elizabeth, and satisfactory progress is being made with the telegraph line to the diamond fields. Tenders have been received for placing the colony in telegraphic communication with Europe, and the Government will shortly submit proposals on the subject to Parliament.

It is stated that there were forwarded from and received at Epsom during the Derby week no fewer than 10,000 telegraphic messages. Of these nearly 3,000 accrued on the Derby day itself, and about 2,500 on the Oaks day. The telegraphing for the press amounted to upward of 35,000 words; while of foreign telegrams more than 150 were sent.

THE receipts of the Submarine Telegraph Company for the month of May, 1873, amount to £9,178. The receipts for the corresponding month of last year amounted to £8,679.

THE cable steamer " Dacia" was expected at Aspinwall Wednesday, June 18, and, after leaving an electrician, would proceed to repair the Jamaica and cables.

THE Telegraph Construction and Maintenance Company's steamer, " Africa," has arrived at Vigo to lay the duplicate line to Falmouth for the Eastern Company, and the steamer " Investigator " has sailed to complete the requisite connections between the various islands of the West Indies.

A SECOND cable from the coast of Cornwall to Spain has been opened for business. This increase in the facilities for the transmission of despatches between England and Spain has led to a reduction of the tariff charges for the transmission of messages.

THE resolutions confirming the terms of the amalgamation of the Anglo-American, French, and New York, Newfoundland and London Cable Companies, have been unanimously passed by the shareholders of the French and Anglo-American companies. They had previously been confirmed by the Newfoundland shareholders.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, JULY 1, 1873.

EXERCISE CARE AS TO THE NEW RATES.

The revised rates of the Western Union Company go into effect to-day. Managers should exercise great care in checking and entering messages, in order to avoid the necessity of error sheets. Particular attention should be paid to the checks of messages affected by the changes in the local distance scale. Where there is any doubt as to the amount paid or to be collected, arising from a misunderstanding as to the distance between stations, full information should be given by the check.

SUPPLEMENT TO THE JOURNAL.

It was intended to have issued a supplement with this issue of the JOURNAL, to contain all changes which had taken place in the rates since the last tariff book was issued, in October, 1872, but it was found impossible, at the last moment, to prepare it in time. It will accompany the next number of the JOURNAL.

PRINCETON, COLUSA AND GRAND ISLAND TELEGRAPH COMPANY.

The first section of this line, twenty-five miles in length, connecting with the Western Union at Colusa, Cal., has been completed, and offices established at Princeton, Boggs, Sycamore, Grand Island Mills, Grand Island, and Colusa, Cal. It is the intention to extend the line about two hundred miles further, taking in Mendocino, or Round Valley Reservation, Kanawha, and the settlements down Eel River, Humboldt and Eureka, on Humboldt Bay, a region at present wholly devoid of telegraphic connection with other parts of the country.

Assistant Gen'l Superintendent Ladd, of the Pacific Division, has materially aided the managers of the new line in their enterprise.

Apropos of Minister Schenck's *exposé* of fraud and corruption, comes the official report of the engineers employed to examine the Emma mine, of which Mr. Schenck was a director and trustee, and which he so strongly endorsed, over his official signature as Ambassador of the United States. In the Washington correspondence of the New York *Herald*, June 26, is the following:

Information from one of the engineers employed to examine the famous Emma mine, with which Minister Schenck's name was at one time connected, shows that the mine is a total failure. The British stockholders paid one million sterling, and are now eight hundred and forty thousand pounds minus, and have little or nothing on the mine. This is the official report to the stockholders.

SHALL THE INSURANCE PAYMENTS BE LIMITED?

The movement in favor of limiting the payments by the Telegraphers' Mutual Life Insurance Association to one thousand dollars at each death has made considerable progress, despite the active opposition of almost every one of the older members. There is much to be said on both sides of the question, and, in response to the invitation of the JOURNAL, members are freely communicating their views upon the subject.

The communications we have received respecting this matter are quite numerous, each conveying nearly the same argument on either side, so, as we cannot find space for all, and desiring to slight none, we place before our readers, in our own language, the opinions thus far expressed.

It is urged by those in favor of the limitation that, as a matter of policy, one thousand dollars is as large a sum as an association of this nature should assume to pay; that this amount is ample to afford the relief for which the Association was instituted; that a majority of the members are so situated, pecuniarily, that, under the present system, the tax is becoming onerous, and likely to become more so with the growth of the Association. Further, that those who can afford to meet the frequent assessments which a large membership will undoubtedly entail, can procure a policy in a regular life insurance company at less cost. This statement of the case appears to us to be unanswerable.

The opponents of the movement base their dissent upon the ground that the institution was organized upon the express understanding that the amount to be paid at a death was limited only by the number of members; that the Association, having been, as it were, nursed and brought to its present prosperous condition under this understanding, it would be unjust to the founders of the organization, and to those who subsequently joined with this belief. Also, that the reserve fund which has been accumulated, and on the strength of which it is proposed to initiate the "new departure," having been paid in by the present members, it is not right that new-comers should participate in advantages for which they render no equivalent. To a degree, this last objection possesses force, but it can easily be overcome, and beyond this there is no strength in the position taken. But let us see the exact condition of affairs.

The Association was organized in 1867, purely as a relief society. It had a very humble beginning, and when the amount paid at a death reached five hundred dollars it was deemed a great result. And so it was. There was no thought of profit, only of the amount of good possible to be done by a small contribution from each, which was hardly felt, even by the poorest. The Association has increased so largely that, unless some limit of assessment is made, less than that imposed by one of the by-laws, members with small incomes will be driven out from sheer inability to pay. This, of course, is not desired by any one. Their rights and condition must be respected, and there is but one way to do it, and that is to limit the payments, and thus decrease the amount of assessment. The by-laws confine membership to fifteen hundred. This provision we consider unwise, and advise its repeal. Every telegrapher should be a member, and the assessments should be so adjusted that this should be possible. Then the Association would prove that for which it was instituted, not a support for life or for years, but a present relief for necessity.

SUCCESSFUL LAYING OF THE FOURTH ATLANTIC CABLE.

The steamship "Great Eastern," which commenced laying the fourth Atlantic cable at noon on June 16th, arrived at Heart's Content at eight o'clock P. M. of the 27th, having successfully paid out all the deep sea cable to within eighty miles of that place, when the wire was cut and buoyed at nine o'clock A. M. of that day. Owing to a heavy southwesterly gale, which was blowing at the time, it was deemed imprudent to attempt to pass the cable line to the steamship "Hibernia" for connection with the shore end, which was on board that vessel. The cable will be spliced and run in as soon as the weather moderates.

In the cable just laid three different types of cable are used, each of which embodies features distinct from the others, and which have been suggested by previous experience. These types, known as A, B and C, are the shore ends, the intermediate cables, and the deep sea cable. The shore end is, of course, a very heavy cable, capable of meeting any contingency that might arise from coasting navigation, and extending from three to five miles out, according to circumstances. The intermediate cables are of lighter and slightly varying patterns, and are continued from the shore ends for distances of from 150 to 250 miles, when they are joined by the deep sea cable, which is of a still lighter design. The conductor in each case is a strand of seven copper wires insulated with gutta percha, prepared according to Mr. Willoughby Smith's system, alternating with Chatterton's compound, the cores being covered with a serving of jute yarn steeped in a solution of preservative mixture. The outer covering of the shore ends consists of twelve strands, each formed of three galvanized iron wires, served with yarn, and passed through Clark's compound, which contains silica. This is whipped with a fine strand of jute, and again passed through the compound. In another type of shore end the served core is closed with twelve wires, and finished as in the previous case. The intermediate types are similarly constructed, the difference being in the size of the wire which forms the outer covering. The deep sea cable has its core closed with ten strands of wire and hemp, each strand being passed through Clark's compound. The cable has a whipping of jute yarn, and has been passed through Clark's compound. The metallic portions of the cable are thus efficiently protected, in proof of which it may be mentioned that portions of cable thus made have been recovered after three years' immersion in the Atlantic, and have been found to be as perfect as when they left the factory. The core of the new cable having been originally intended for a longer route than that now decided upon, was made of a heavier section than it otherwise would have been, so that it possesses a very high speaking capacity.

The new cable follows a course to the north of the route over which the line of 1865 was laid, and it does not approach the latter nearer than thirty

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miles, except at the shore ends at Valentia and Heart's Content. The length of the new line is about the same as that of the cable of 1865—nineteen hundred miles. As soon as the cable is completed to the shore the "Hibernia," "Edinburgh" and "Robert Lowe," which accompanied the "Great Eastern" across the Atlantic, will lay the two Sydney cables, after which the "Hibernia" will fill up with coal and join the "Great Eastern" at Heart's Content. The two will then proceed eastward along the course of the 1865 cable to the point of rupture, which is 568 miles from Valentia, where it will be grappled for, and, it is to be hoped, found and repaired. On leaving Sydney the "Robert Lowe" will proceed to repair the Duxbury section of the French Atlantic Cable, which was broken last month close in shore. She will also effect some repairs in the cables belonging to the Newfoundland Telegraph Company. The "Edinburgh," when her task has been completed, will fill up with coal and return to the Thames to ship a portion of the Brazilian cable, the greater part of which it is intended to lay during the present year.

LETTER FROM MINISTER SCHENCK, RELATIVE TO ALLEGED OVERCHARGES IN CONNECTION WITH CABLE BUSINESS.

LEGATION OF THE UNITED STATES,
LONDON, April 13, 1873.

SIR: I have been thinking for some time of writing to you in relation to the charges made on telegrams sent to the United States by the Anglo-American Telegraph Company. That company have an arrangement with the Western Union Telegraph Company, in our country, through which a systematic imposition is practised, which ought to be exposed. I bring it to your attention because communications transmitted by ocean cable on Government business are subjected to the same overcharges as are the messages of individuals, and the public and private persons are equally concerned in having what is done known, with a view to some correction of the wrong. I discovered something of what I am about to explain three or four months ago, and since then have been making inquiries which have elicited the following, as I believe a true statement of the case:

These two companies have some contract between them by which it is agreed and arranged that messages sent from England by the Anglo-American to all points in the United States shall be received and transmitted by the Western Union to their destinations. Thus the interior or land lines of the latter company are made continuations of the cable on the American side of the Atlantic. This is proper enough, and a convenience to every one as well as to the contracting parties. It gives to the Western Union a monopoly of business coming through the cable to America, and naturally for that monopoly they agree to pay something. Accordingly the contract binds the Western Union to allow the Anglo-American to retain a certain portion—being, I believe, one-third of what is charged for transmission over the wires in the United States.

The Anglo-American Company have a tariff of prices. The charge for a message from London to New York, or points east of New York, is four shillings (English money) per word. After this month it is understood they have promised a reduction to three shillings a word.

The Western Union Company have also a tariff of prices. The charge now is, from New York to Washington, for the first ten words forty cents, and three cents for each succeeding word; from New York to Chicago, for the first ten words $1, and seven cents for each word beyond ten; from New York to San Francisco, $2.50 for ten words, and seventeen cents for each word beyond ten, and so in proportion to other points.

Every word sent by the cable is charged for, including date, address and signature. On the land lines of the Western Union within the United States there is no charge made for date, address and signature. But now observe the practice, under the contract before referred to, between the British and American companies. A message is sent by the cable from London to Washington, Chicago or San Francisco. The office here demands and collects for each word four shillings, which pays for transmission to New York, and also three pence more for each word to Washington, nine pence more for each word to Chicago, and fifteen pence more for each word to San Francisco. This, with exchange and the present difference between gold and United States currency, is, for that part of the service which lies beyond New York, more than double the proper charge of the Western Union Company, and is so far an overcharge, to be divided between the companies who are the parties to it.

When the charges imposed for transmission over the wires west of New York are double the regular tariff prices, the American Company can well afford to allow the cable company one-third of the receipts for that portion of the service performed by their lines.

If the charge were only double, the account would stand thus: The Western Union being credited $2, when the proper amount to be collected from them was but $1, they would leave sixty-six and two-third cents with the British Company, and yet receive $1.33⅓ for their share, being thirty-three and one-third cents in excess of their regular and legitimate charge at home. But the case is, in some particulars, much worse than this. Let us illustrate, by supposing a message of 100 words sent from London to Washington. Ten of these words may be supposed to constitute the date, address and names. The cable company would require to be paid here, for the transmission over the land line between New York and Washington, three pence on each of the whole 100 words. This would amount to £1 5s., which is equal to $6.96. But the regular published charge for such message by the Western Union would be, for the date, address, names—ten words—nothing; for the first ten words, forty cents; for the remaining eighty words, at three cents, $2.40; 100 words $2.80. Thus, there would be extorted for the service in the United States an overcharge, equivalent in currency to $4.16, and the $6.96 being divided, would give the British Company the equivalent of $2.32, and leave the American Company, for their share, $4.64, which is still $1.84 beyond their legitimate charge at home.

In the case of short messages, where the address, date and names bear a larger proportion to the text, the proportional overcharge would be greater. For a message, for instance, of twenty words, there would be collected here, for the line from New York to Washington, five shillings—equal to $1.39 in United States currency, instead of forty cents, which would be the charge at home. In such a case, the Western Union pocket, for their share, for services performed by them, ninety-three cents, being much more than twice their whole proper charge. And it must be remembered, that a large proportion of telegrams sent across the ocean have a text of but ten words or less.

This may seem dealing with an inconsiderable matter, but considered in the aggregate, and computing the percentage of unjustifiable charges, it is no small thing, as affecting the cost of sending intelligence between the two countries. So far as the Government of the United States is concerned, it must have made a large difference during the past year.

I have no means of knowing whether messages coming from Washington or other points in the United States, to be transmitted by the cable to England, are subjected to the same or similar overcharges, or not. My calculations are based on 109 for exchange and 115 for gold, which has been for some time a fair average.

I submit this exposure to you for such use as you may deem it proper to make of the information.

I have the honor to be, sir, very respectfully,

Your obedient servant,
ROBERT C. SCHENCK.

To Hon. HAMILTON FISH,
Secretary of State,
Washington, D. C.

MINISTER SCHENCK'S MISREPRESENTATIONS REFUTED BY MR. ORTON.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, *June* 21, 1873.

Sir: I have had the honor to receive your communication of the 11th instant, replying to mine of the 10th, concerning the letter of General Robert C. Schenck, United States Minister to England, published in the *New York Herald* of Sunday, June 8th, instant, and which you inform me is substantially a correct copy.

It appears, therefore, that the Minister of the United States in London has addressed an official letter to the Department of State, in which grave charges are made affecting the reputation for honorable dealing of certain citizens of the United States. A copy of these charges was, as you inform me, transmitted to the Post-office Department, and by the latter was given to the press for publication. It does not appear that any effort was made, either by the State or Post-office Department, to ascertain if the charges were true, and therefore it may be fairly inferred that they were assumed to be true by the officials of both departments, who appear to have also assumed that the correction of the abuses alleged would be secured by making them public.

The charges made by General Schenck which concern the managers of the Western Union Telegraph Company, are these:

1. That the Anglo-American Telegraph Company, which controls the submarine cables in operation between Europe and America, "have an arrangement with the Western Union Telegraph Company *through which a systematic imposition is practiced which ought to be exposed*," which arrangement "binds the Western Union" to allow the cable companies to retain "one-third of what is charged" for the transmission of cable messages over the land lines in the United States.

2. That, under this arrangement, the charges for the transmission of cable messages over the wires, beyond New York, are double the regular tariff prices charged on domestic messages, "an overcharge to be divided between the companies who are parties to it," and that "the Western Union *pocket*, for their share, much more than twice their whole proper charge."

3. That "communications transmitted by ocean cable on Government business are subject to the same overcharges as are the messages of individuals."

To these charges I respectfully submit the following reply:

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1. It is true that the Western Union Company have made an arrangement with the companies controlling the Atlantic cables, for connection and for the mutual exchange of business, which, as General Schenck says, "is proper enough, and a convenience to every one, as well as to the contracting parties."

2. But it is not true that this arrangement "binds the Western Union Company" to allow the cable companies to retain one-third, or any other share, of what is charged for the transmission of cable messages over the land lines in the United States, nor that the charges for such transmission are in excess of the average charges for other telegraphic messages.

The facts are these: The cable business is controlled by the cable companies, who fix the rates to be charged and make and modify the rules governing its conduct. The Western Union Company have agreed to apply these rates and rules to cable messages in the United States, whether received from or transmitted to the cables, and to accept certain fixed rates per word as their compensation for all services connected with the transmission of such messages, including the keeping, proper accounts, and collecting and paying over the moneys accruing therefrom.

There are more than 6,000 telegraph stations in the United States, and it being impracticable to supply European offices with a tariff to each of such stations, this country is divided into four districts, for each of which a uniform rate is established. The cable rate of one dollar per word between England and New York includes eight cents a word payable to the Western Union Telegraph Company for their part of the service. The rates beyond New York are:

For all stations in New Jersey, Pensylvania, Delaware, Maryland and District of Columbia ..... 3 cents a word.
For all other territory east of the Mississippi River, including the city of St. Louis ..... 15 cents a word.
For all other stations in the United States west of the Mississippi River ... 20 cents a word.

The rates to points on the Pacific coast have been slightly reduced since the date of Gen'l Schenck's letter.

Under the rules of the Western Union Company the message rate in the United States is for a minimum of ten words, with a rate per word for additional words above ten; but the rules of the cable companies permit any number of words to be sent at the word rate, and the result is that a majority of the cable messages contain less than ten words, those of three, four and five words being common, and occasionally a message is offered containing only two words. The Western Union Company charges one dollar for ten words or less between Chicago and New York. The majority of cable messages from Chicago contain less than ten words, the average for an entire month having been as low as six words.

In the case of St. Louis and St. Paul the rate on domestic messages to New York is $1.50 for ten words or less, while the cable rate is fifteen cents a word. But between New York, New Orleans and Mobile the local rate is $2.00 for ten words or—never less and sometimes more than—twenty cents a word, while the rate on cable messages is only fifteen cents a word. The result is, that on cable messages the Western Union Company actually receive only the average of their local rates, while they are obliged to transmit cable messages of three words from New Orleans and St. Louis to New York for forty-five cents, or from San Francisco and Oregon for sixty cents. Such messages are handled at considerable loss, and if charged by Western Union rules would be treated as containing ten words. Concerning the rates collected in England, or other portions of Europe, for messages to stations in the United States the Western Union Company have no voice, and in respect to many of them have had no knowledge until prompted to inquire by the published charges made by Gen. Schenck.

The Western Union Company agree to perform specific services for a fixed compensation, all of which they receive, and no part of which is, in any manner, divided, refunded, or otherwise paid as a consideration for having the cable business given exclusively to them. They are no more responsible for the tolls charged on cable messages in Europe than a railway company in the United States would be for the freight charged at Liverpool on merchandise destined for Chicago or San Francisco, which should include the charges payable to the railway company.

3. It is also untrue that "communications transmitted by ocean cable on Government business are subjected to the same overcharges as are the messages of individuals," or to any overcharges whatever; as will clearly appear by the following statement, which can be verified by a reference to the vouchers in the State Department:

The tariff on cable messages from London to Washington, paid in London, is four shillings and three pence a word. When paid in Washington the charge is $1.03 a word. But although there is no obligation on the part of the cable companies to transmit messages "on Government business" at less rates than for individuals, such messages are transmitted *at half rates between London and New York*. Instead, therefore, of the rate of four shillings and three pence a word, London to Washington, the State Department pays only two shillings and three pence, and from Washington to London fifty-three cents a word, instead of $1.03.

Gen. Schenck's zeal and efficiency in exposing "systematic imposition" upon the public, as sometimes practiced by the promoters and managers of swindling corporations, are widely known and fully appreciated, especially in England. But he could not have been aware, when he attached his official signature to erroneous charges, which probably he did not prepare, nor even carefully examine, that his reputation and office were being used by the active and unscrupulous agents of an opposition cable scheme. Yet such is evidently the fact. I submit, however, whether it is a part of the official duty of the American Minister at London either to seek to relieve the people of England from what he is pleased to style the "systematic imposition" of an English corporation, whose conduct is satisfactory to the British public and Government, or to arraign citizens of the United States before our Government and people upon charges concerning the conduct of their private business, which, although absolutely groundless, are certain to prove injurious.

To the success of the great enterprises in which the cable companies and the Western Union Company are engaged, the United States Government has not contributed one dollar. More than this, it has refused, in at least one instance, to pay for official messages exchanged with a foreign Government, until its obligation to do so was affirmed by the decision of a Federal Court. It would seem not unreasonable, then, that these companies, whose capital and enterprise have connected the United States with the telegraphic systems which are rapidly encircling the globe, if not entitled to receive special favors from our Government, should at least be exempt from the open hostility of its officials.

It seems unfair for a representative of the United States at a foreign Government to lend a willing ear and the influence of his office to the scheme of those who have no other interest in the business than the hope that something may be made out of it. But it seems still more unfair that the official charges reported by this representative to his Government should be by the latter given to the public, with an implied endorsement of their accuracy, without notice to the parties charged, and without inquiry as to the truth of the allegations.

I have the honor to be,
Very respectfully,
Your obedient servant,
WILLIAM ORTON,
President.

To HON. HAMILTON FISH,
Secretary of State.
WASHINGTON, D. C.

IMPROVEMENTS IN TELEGRAPHIC INSTRUMENTS.

The Elizabeth, N. J., *Daily Advertiser and Journal*, of the 13th ult., says:

Through the courtesy of Mr. C. D. Tull, of the Superintendent's and Engineer's Office, Central Railroad, we were shown a few days ago some unusually fine telegraphic instruments forwarded to him by A. G. Davis, Superintendent of Telegraph of the Baltimore and Ohio Railroad. The principal features of these instruments, aside from the fine setting and workmanship, are the improvements on the instruments in ordinary use, and the economy in size, the same effects being produced by relays and sounders about half as large as those in common use. The first of these improvements is a patent wire connection. In all the instruments now in use the connection is made by passing the wire through a small hole in a post provided for that purpose, and then fastening it my means of a screw, the end of which presses down upon the wire. It is not impossible that with this screw the connection might be but partially made, or even not made at all. With the new instrument it is made by means of a metallic button which screws firmly down on the wire which is wound round a threaded post, thus being sure to make a complete connection at some point of the wire, with no possibility of breaking it.

Another improvement is in covering what is known as the "main wire" in the relays with a gutta-percha tube, thus completely protecting it while the relays are being cleaned. The adjusting spring which moves the magnet backward or forward is substituted by a double screw which adjusts the magnet and then it holds it firmly in its place. The keys, too, are furnished with a decided improvement in what is known as the circuit breaker. This is a small spring which, in closing the circuit, presses upon a metallic button, one face of which is slightly oval. The spring, even if the circuit breaker be but slightly pressed toward the key, will touch some portion of the button and thus complete the circuit. There are other slight alterations for the better in various parts of the instruments, and the manner in which they are fitted up is far superior to anything yet exhibited in the manufacture of telegraphic instruments. The metal portions of them are nickel plated, and the bases are black walnut, inlaid with the finest French walnut. They are about half the size of ordinary instruments, and are superior in every way. They are manufactured by Watts &

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Co., of Baltimore, and it is possible that the Central Railroad Company will in time adopt them in place of the ones now in use, as the difference in the price is by no means commensurate with the advantages.

SOUNDINGS FOR A CABLE BETWEEN THE UNITED STATES AND JAPAN.

The United States steamship "Tuscarora," Commander George E. Belknap, now at San Francisco, is being fitted to make deep-sea soundings in the Pacific for a cable route between the United States and Japan, this authority having been granted by the last Congress. The sounding apparatus made for the Juniata has been sent to San Francisco, together with fifteen miles of carbolized sounding line; thirty miles of steel wire, and one of Thomson's sounding apparatus have also been ordered. The vessel will be ready to sail early in July, and will proceed toward Puget Sound, thence to the Aleutian Islands, and stop at Yokohama.

CUBAN CENSORSHIP OF NEWS TELEGRAPHIC DESPATCHES.—PROTEST TO THE HOME GOVERNMENT.

Despatches received by steamer from Havana at Key West, June 16, state that the censorship over news despatches transmitted to Cuba by the cable is maintained with unremitting severity. Despatches from New York to the Havana press were suppressed last week, and there is great complaint. The leading Republicans have sent a telegram to the Government of Madrid, remonstrating against the arbitrary conduct of the local authorities, and demanding a speedy modification, if not abolition of the rules of censorship, the rigid enforcement of which they declare to be unnecessary and intolerable.

A favorable reply is expected from the Spanish home Government.

SCIENTIFIC PRIZES.

Among the prizes awarded by the *Société d'Encouragement pour l'Industrie Nationale* of Paris for 1873, is the following:

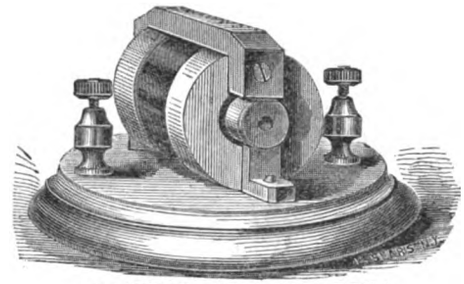
Economic arts.—Prize of $600 for an apparatus giving an electric current, constant in direction and intensity, whose electro-motive force and conductibility shall be comparable to those of a nitric acid battery of sixty to eighty ordinary sized elements, and showing superiority in economy or salubrity over the machines now in use; the prize was awarded to M. Gramme for his magneto-electric machine.

ELECTRICAL GAS LIGHTING.—A novel device for lighting gas by electricity, lately patented, is made as follows: A glass cup is immersed in liquid; and when the gas is turned on it enters under the cup and lifts the same, thereby establishing connection with a battery which heats a platinum wire placed over the burner, and thus ignites the gas. Mueller and Meier, of Hanover, Germany, are the inventors.

EXPERIMENT IN ELECTRO-DYNAMICS.—MM. Planté and Niaudot-Breguet.—If a secondary couple (of lead plates) be charged with a Gramme magneto-electric machine, and then be left undischarged in connection with the machine which has been stopped, the latter presently begins to turn under the influence of the current from the secondary couple in the same direction as it was turned in charging, and continues turning (more slowly, indeed, yet at a considerable rate) for two or three minutes till the couple is discharged. In this restitution there is, probably, only slight loss. That the machine, in its motion, should turn in the same direction as before seems paradoxical, but may be explained by the laws of currents. Further, the secondary couple once charged gives a current more powerful than that produced by the machine which it puts in motion, the difference of intensities continuing the motion.

SOMETHING NEW.

"The Rattler" Telegraph Sounder.



(PATENT APPLIED FOR.)

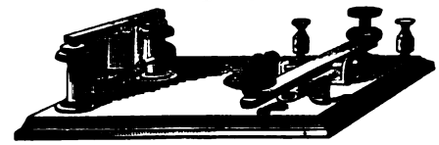
This is a very simple and effective Instrument, and, as it does not require any spring to draw the lever back, is always adjusted.

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(PATENT APPLIED FOR.)

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Price, complete, Sounder and Key mounted on finely finished, Mahogany Base, with one Cell Hill's Patent Battery, with Chemicals, eight feet of Office Wire, and "Smith's Manual of Telegraphy"	$7 50
Two sets	14 50
Price of Sounder and Key only	6 50
" " " with Cut Out and Lightning Arrester attached	7 50

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IN HARD RUBBER CASES.

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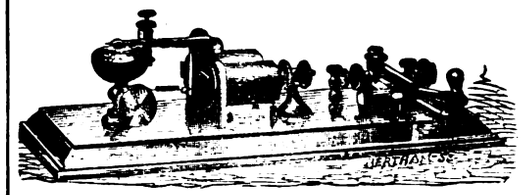
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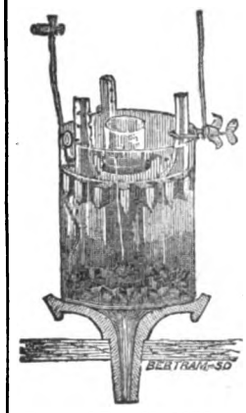
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For Light Main.

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Patented Dec. 31, 1872.

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by which guests telegraph their wants to the clerk, and avoid waiting to have the boy come and see what is required.

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PATENT BATTERY INSULATOR

shown, holdin a cup of the Baltimore Battery in the above cut, which most effectually insulates the Battery as the drip passes off *thr ugh a hole in the Insulator.*

The Electrician of the Western Union Telegraph Company, Mr. PRESCOTT, says of it:—"I think your Battery Insulator a very admirably adapted for the purpose designed, and it ought to receive general adoption."

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RAILROAD SIGNALS.
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 16. NEW YORK, JULY 15, 1873. WHOLE NO. 137.

STEARNS'S DUPLEX TELEGRAPH.

The following diagram (figure 1) represents the arrangement of Stearns's Duplex Telegraph for a terminal office. The whole lines represent the main wires, and the broken lines the local wires. *K*, *K'*, are keys in a local circuit which operates the transmitter *T*, *L*, *L'*, are local batteries. *M* is a main battery *G*, ground. *S*, common Morse sounder. *Rh*, rheostat. *C*, condenser. *R*, duplex relay. *t*, *t'*, are binding posts connected with the adjustable resistance coils. *r*, *r'*, are the terminals of small resistance coils used for maintaining an equal resistance when line is to earth through battery, or to earth direct. The connections of the wires with the various parts will be readily traced. The plugs in the resistance coils must be removed, until the resistance of the coils equals the resistance of the line. When they are equal the armature of the relay will not be affected by the working of the transmitting sounder. The object of the condenser is to receive a charge from the main battery equal to that entering the line, which charge being returned through the relay coil, connected with the rheostat, at the same time that the line returns its charge through the other coil neutralizes its effect upon the armature.

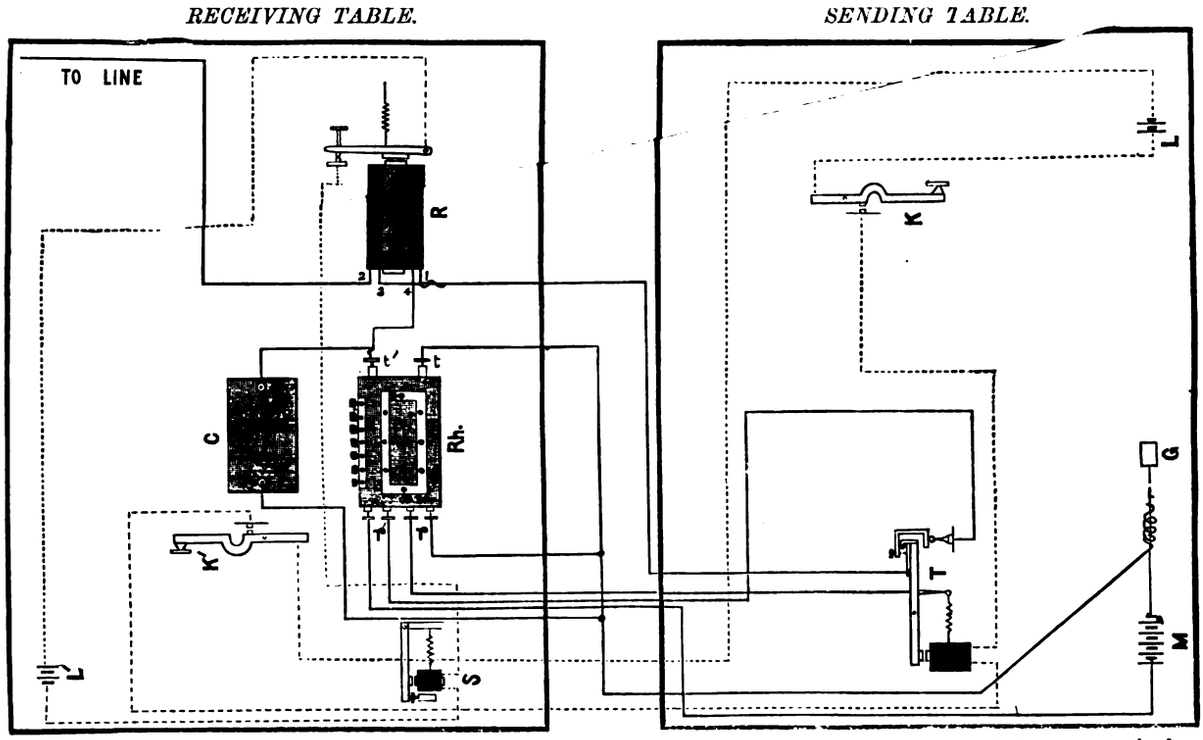


Figure 1..

The small resistance coils represented in figure 1 as being enclosed in the box containing rheostat *Rh* at *r* and *r'*, are generally enclosed in separate boxes.

Figure 2 illustrates the method devised for regulating the condenser charge by means of the rheostat.

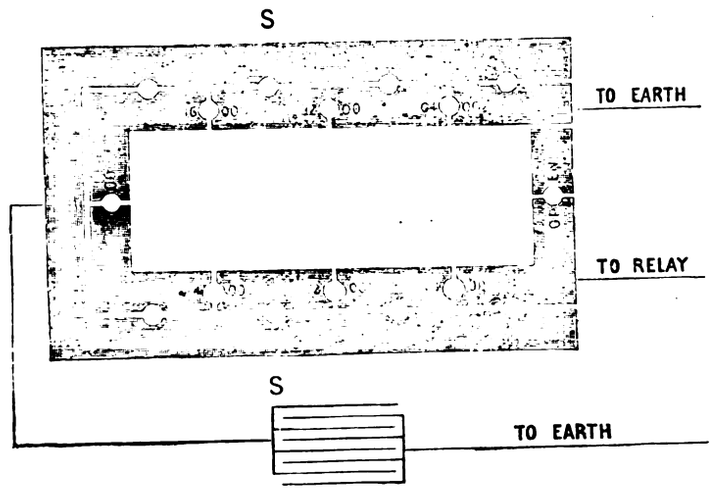


Figure 2.

Strips of brass are placed upon the top of the rheostat for the purpose of affording a means of adjusting or regulating the effect of the condenser charge upon the relay, when the condenser has a static capacity greater than that of the line wire.

For the purpose of explanation, let us suppose the rheostat composed of a number of equal resistances, say 1,000 ohms each (figure 3), and the static capacity of the line be 4 micro-farads, and that of the condenser to be 8 micro-farads. If the condenser wire be connected, as is usual, at *a*, or between the relay and the rheostat, it will receive a high charge from the battery, and when the battery is removed will return the whole, or nearly the whole, of the charge through the relay to the earth, and the charge being greater than that returned from the line will overbalance the latter and produce a movement of the armature. If the condenser wire be connected at any other point, as, for example, between the coils *b* and *c*, it will not receive so high a charge from the battery as it would if connected at *a*, and this smaller charge upon returning will divide, a portion only of it passing in the direction of the arrow *g* through coil *e* and the relay to the earth; the other portion of the charge passing through the coils *c* and *d* in the direction of the arrow *h* to the earth. Again, if the condenser wire be connected at *e*, or between the rheostat and the earth, it will receive no charge at all from the battery, and of course can return none.

Thus it will be seen, that by connecting the condenser at different points between the coils of the rheostat, any required proportion of the charge can be sent through the relay.

The rheostat is arranged substantially as shown in Figure 2.

The strip *S* furnishes a means of connecting the condenser between any two coils of the rheostat, and thus regulating the quantity of charge which shall flow from the condenser through the relay with sufficient exactness.

In making up the resistance necessary to balance the line in any case, as many as possible of the *low* numbers should be used, so that these low resistances, or any of them, may be interposed between the relay and the point where the condenser is connected.

The accompanying diagram (Figure 4) represents the plan adopted by the Western Union Telegraph Company for connecting the wires with the duplex instruments, so connecting that the same desks, and, as far as practicable, the same instruments may be used for working either the duplex or ordinary Morse system. To accomplish this, all that is necessary, in addition to the duplex set, is one common

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relay, two keys, and three "three-point switches." This forms an equipment for two desks, which may be used either as the sending and receiving desk for a wire worked by the duplex system, or for two wires worked by the Morse system, as may be desired.

The two desks are represented in the diagram, the one on the right being used as the receiving desk, and the one on the left as the sending desk, when the duplex system is in operation. *R* is a common Morse relay. *R'*, a differential duplex relay. *S* is a common sounder. *S'*, a duplex sending sounder. *Rh* is a rheostat. The three-point switches are shown near the bottom of the drawing.

When it is desired to work the duplex system, the three switches are each turned to the left. When the desks are to be used for two wires worked by the Morse system, the switches are turned to the right.

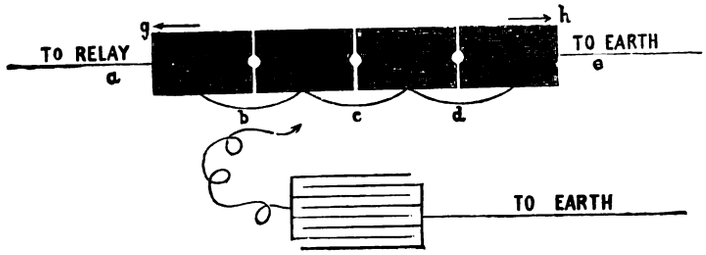


Figure 3.

ÆRIAL TELEGRAPH CABLES.

One of the things which attract the attention of a New Yorker visiting London is the telegraph cable stretched over the roofs of the houses in many directions. There are few of the single wires which are so common in New York, and none of those street nuisances, the telegraph poles. Many wires are packed together with insulating material, and thus formed into a cable; but as the wires are slender (and presumably of copper), and the insulating material is soft, the cable requires support at short distances. To this end a steel sustaining wire is first put up, and from this the cable is suspended.

DUPLEX SENDING DESK. *DUPLEX RECEIVING DESK.*

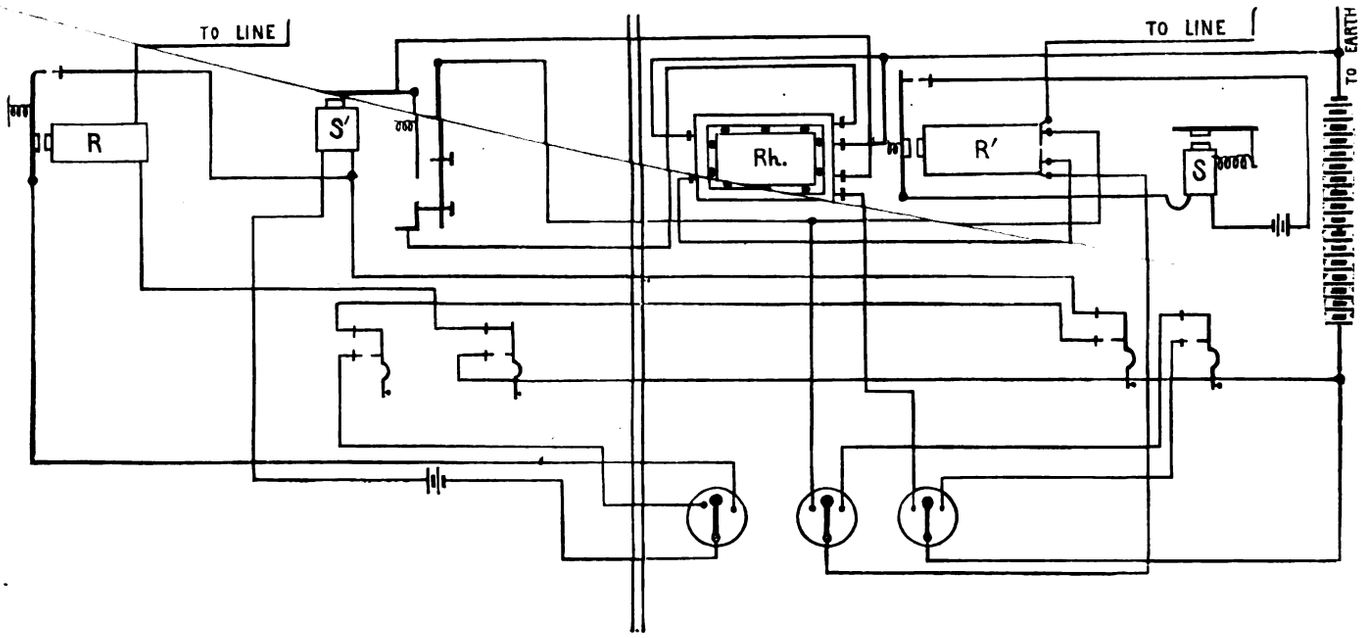


Figure 4.

ELECTRICAL TRANSMISSION BY CABLES.

As the first application of current to a cable is to charge it, it is evident that, before any employable electricity can issue from the further end, the corresponding charge must be completed. We may, therefore, assume that the time required by a wave to charge a cable, and the retardation on the time required for a wave passing from one end to the other to reach a given amplitude, are identical. Mr. Varley is of opinion that the electric current commences flowing out of one end of a cable at the very instant that contact is made with the battery at the other end, but that it is a considerable time before it reaches an appreciable strength; that it then goes on augmenting in strength, never absolutely attaining its maximum force. This may be so; but whatever the nature of electricity may be, it is difficult to imagine the total absence of inertia to its propagation. It is more probable that the velocity of electricity is the same in all conductors, whether submarine or overhead, or in any other form, and that it is very great, but that the resistance and induction of the circuit combine to prevent the wave reaching an appreciable strength for some time after it has commenced to flow out. This is a question, however, which can never be settled experimentally, because we can only recognize the issuing wave after it has attained strength enough to perform some mechanical effect.—*Robert Sabine, in the Telegraphic Journal.*

ELECTRICAL APPARATUS.

Letters Patent have been awarded to Mr. Stanley, of Holborn, for improvements in electrical apparatus, stated in the specification to consist in the construction of the class of electric batteries which generate dynamic electricity so as to render them more portable, by making the cell (jar or bottle) which contains the voltaic couple of about double the internal length of the active portion of the plates, which will be generally of zinc and carbon. The plates, if they extend beyond the half the interior, must be insulated from action of the exciting fluid, or they may be half length, and be fixed either in the top or the bottom of the cell. The purpose is that the battery may be turned upside down, and in such position there will be no electrical action, as the fluid (or fluids in case of an inner pot) will not then touch the plates. The batteries are sealed over with some elastic substance, in such a manner that the fluid cannot escape. Within the sealing is a valve, so fixed that the internal gases may escape at less pressure than would break the cell or the sealing; this valve consists of a tube with a piece of sheet india-rubber tied over it as an air-pump valve; the novelty being the application of this valve to a sealed battery cell. A further arrangement is provided for connection of batteries with apparatus to form a portable bell. For this a box is divided into two parts, one to contain the battery, which is closed, and the other to contain the electrical bell and a roller to roll up the conducting wires with touch. This part has a door, which closes the apparatus when out of use, and a handle above for carrying the whole. Mr. Stanley claims as novelties a long cell, half active; a sealed cell, with a peculiar valve; a water-tight cap for cells; a closed receptacle, with solid terminals for cells; a bell rendered portable; a portable coil, set in motion by reversing the apparatus; and a double receptacle for battery—the last three being novelties as instances of application of the previous parts.—*Telegraphic Journal.*

REMARKABLE ELECTRICAL PROPERTY OF GLYCERINE.—Prof. Waltenhofen finds that when a card is coated with glycerine on one side, and points connected with conductors leading to the coatings of a Leyden jar, or the terminals of a Ruhmkorff coil, are placed in contact with opposite sides, but not exactly opposite each other, the positive in contact with the coated side, the perforation by the discharge will invariably be opposite the positive point instead of the negative, as in Lullin's experiment.

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ON THE EFFECTS PRODUCED BY ELECTRIC CURRENTS ON MERCURY IMMERSED IN DIFFERENT SOLUTIONS.

By M. TH. Du Moncel.

Mr. Hughes has shown that if we immerse in ordinary water some drops of mercury, this metal dilates under the influence of the passage of the electric current, when the circuit is formed by the intervention of a stratum of water. I have made some experiments of this character, and I append the results. If we study the movements of mercury in solutions of several natures, we perceive that the direction of impulsion* varies according to the quantity of gas which is disengaged at one or other of the electrodes, and the movement is effected toward the electrode which disengages the least. Also, with ordinary water the movement is towards the positive pole. With solutions of sulphate of copper, sulphate of iron, bichromate of potash, sulphate of mercury, &c., in which hydrogen is largely absorbed in the reduction of the salt, the movement is effected towards the negative pole. Nevertheless, the more or less perfect conductibility of the solution takes part in the phenomena, and we can test this by taking rain water, spring water, and water acidulated with sulphuric acid. With the two first liquids motion is effected in the same direction, but it is more charactised in one case than the other, by reason of the differences in intensity of the electric current traversing them. With the acidulated solution the movement becomes imperceptible, and often in a contrary direction to that which obtained with pure water, because the disengagement of gas at the two electrodes was effected in nearly the same proportion. If we employ solutions capable of disengaging at the positive pole a gas susceptible of energetic combination with hydrogen, when in the nascent state, as occurs with solutions of chloride of sodium, cyanide of potassium, furnishing chloride and cyanogen at the positive electrode, the effects, as to the movements of the mercury, are rather capricious, and manifest themselves generally (after the mercury has constituted for some instants the negative electrode) in a direction similar to that produced with water. Also, if we pass, during a short time, the current from a battery of eight Chutaux elements through a solution of chloride of sodium, at the centre of which we immerse a drop of mercury put into connection with the negative pole of the battery, and if, having broken this circuit, we plunge into the mercury the positive electrode at which the chlorine is disengaged, an abundant liberation of gas, even more energetic than that which resulted from the action of the battery, is produced at the point of contact of the electrode with the mercury, and during a comparatively long time. If, during this liberation, we plunge the negative electrode into the salt water, the surface of the mercury is immediately covered with a yellow pellicule, which passes rapidly to black, and which appears to be the sub-oxide or protoxide of mercury; but as soon as this film is formed the disengagement of gas ceases, and it is only when the negative electrode is withdrawn, and some instants after the pellicule has disappeared, that the disengagement of gas recommences. This circumstance would lead us to suppose that the gas disengaged is hydrogen, which at the moment of the formation of the sub-oxide is employed in the reduction of the oxide. But what is more curious is, that the phenomena is not produced under two conditions: (1) when the platinum wire has been freed for some instants from the chlorine, or has been wiped; (2) when the mercury has served as the negative electrode, and has been able to condense a sufficiently large quantity of hydrogen gas to furnish a secondary electric action, as in Planté's secondary battery. This condensation is visible to the eye, for at first, when the mercury constitutes the negative electrode, no bubbles of gas appear; it is only later that they appear. This phenomena, apart from the rest, has nothing extraordiuary, if we consider that palladium and nickel can condense considerable masses of hydrogen, and that M. Favre has formed a battery of copper and palladium with condensed hydrogen, in which the gas plays the part of the positive metal. If this manner of interpreting the phenomena be true, the positive electrode put in contact with the mercury after the removal of the negative electrode, should constitute a local gaseous couple (chlorine and hydrogen), which, determining at the contact of the two metals the formation of hydrochloric acid, developes, by the action of this acid, a new electro-motive force in the same direction as that of the gaseous couple, and, consequently, an energetic local current, in which the mercury is negative and disengages hydrogen But, as a fresh disengagement of chlorine results from this local current, it continues for some time. Thus much is certain, that when the mercury has served as a negative electrode for some instants, and we then leave it, it disengages bubbles of gas for some time, diminishes in volume, and ultimately resumes its hemispherical shape. The same effects are exactly reproduced with cyanide of potassium (white and yellow), commercial potash, and even with chloride of ammonium. With the last salt, we reproduce in an interesting manner the curious effect of ammonium alloy. When the solutions are slightly fouled by the residue of the mercurial oxidations, we can easily discover around the drop of mercury the presence of very energetic liquid currents directed from the electrode that gives the least disengagement of gas to that which gives the most. We find, in effect, that the drop of mercury which is interposed between the two electrodes is polarised in two different manners; consequently, the part of the drop which is elongated from the electrode, where the gas is disengaged, liberates gas more quickly than the other. Under these conditions it will sometimes happen that the drop of mercury will rotate on its own axis with great speed. It is probable that these effects are caused by the increase in volume of the mercury from the absorption of hydrogen gas and the mechanical action of the liquid currents. The flattening of the drop, and its enlargement in all directions when one of the electrodes is plunged into the centre of the drop, is easily explained. It is sufficient to consider that in this case the entire surface of the mercury receives the pressure of the gas developed at every point.

* This word is employed in the original to embody an abstract idea of movement in the mercury.—[Trans.]

NEW OZONE GENERATOR.

By T. Wills.

The author stated that Siemens' tube had the disadvantages of being difficult to construct, and very liable to be broken; moreover it became heated after being used for some time. This last objection also applied to Bean's apparatus of glass plates covered with tin foil. Sir Benjamin Brodie, in his experiments, had employed an apparatus similar in principle to the Siemens' tube, but the tin foil surfaces were replaced by water. This worked very efficiently, but it was not easy to adapt to other pieces of apparatus. The new generator consists of a piece of glass tube as cylindrical as possible, with a circular coating of tin foil on the exterior; in the interior is a carefully turned brass box, slightly smaller than the glass tube, and tinned to protect it from the action of the ozone. Through this box a current of ice-cold water can be passed so as to prevent the heating of the apparatus, the oxygen or air passing through the annular space between the box and the glass tube, which is fitted with caps and tubes for that purpose. The brass box and tin foil coating are connected with the induction coil in the usual way. This apparatus yields large quantities of ozone with great ease, and appears to be more powerful than either of the other forms of apparatus with the same battery power; its cost moreover is small, and it is not liable to be broken. It can also easily be adapted to other pieces of apparatus, and the current of cold water keeps the apparatus cool, thus allowing it to be used for any length of time.

Dr. Odling said he had worked with the apparatus and could fully confirm what the speaker had said. He also drew attention to the great convenience of employing paraffin joints when working with ozone, as pointed out by Sir Benjamin Brodie, since that hydrocarbon is unattacked by it.

Mr. Bean asked whether the author had compared the new form of apparatus with his, using the same surface, as he had found that a small surface gave more ozone than a large one with the same battery power.

Mr. Tisley, in reply to a question of Mr. Bean as to the difficulty of obtaining large glass tubes, said that for a large ozone apparatus it would probably be better to use a number of comparatively small tubes worked in a cascade.

THE SOIREE OF THE ROYAL SOCIETY.

Sir George Biddel Airy, K.C.B., at his Soirée given as President of the Royal Society, for the last time before his final resignation of the office, had drawn together several objects of electrical interest. Mr. Willoughby Smith's discovery of the effect of light upon the resistance of selenium was illustrated experimentally by Mr. Latimer Clark. A piece of selenium was enclosed in a test-tube connected at each end to platinum wires, and the tube was placed in a box with a sliding cover, so as to admit any desired quantity of light. The resistance was balanced on a Wheatstone bridge, and with the aid of a Thomson galvanometer the movement of the spot of light of course would follow any variation in the resistance of the selenium. With the box closed, the resistance of the selenium remained constant, but immediately the box was opened the light-index upon the scale began to move.

Another very interesting experiment was shown by Mr. Tisley, to prove the effect of magnetism upon ordinary electrolytic action. Water being decomposed in the ordinary manner, the gases were at once set free, but on connecting the electrodes of the battery with an electro-magnet, the gases commenced to revolve around the magnetic poles. A small bath was placed over the magnet, the bath itself forming one electrode, and a plate in the acidulated water of the bath the other electrode. Immediately the coil was magnetized the evolved gases commenced to revolve round the centre plate at considerable speed.

The Post-office authorities contributed a duplex system of telegraphy; Mr. W. H. Preece sent some instruments illustrating his block system of signalling and his duplex relay of 1855; Dr. Gladstone had one of the new air batteries, and Messrs. Elliott exhibited a Thompson-Varley sliding resistance coil. Mr. Browning's collection of Philosophical instruments attracted their usual full share of notice.

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CORRESPONDENCE.

TURNEY, Mo., June 25, 1873.

To the Editor of the Journal of the Telegraph:

We have as much respect for "Father Morse" as any other American can have, but many improvements have been made on the Morse instruments and no doubt many more will be made; and why not make improvements on the Morse alphabet? It is old fogyism in the extreme to stick to any one system because it is *good*, and refuse a *better*. We do not like the European alphabet. It is decidedly clumsy. But that is no reason why we may not improve the Morse alphabet. Strike out the spaced characters in the Morse alphabet, and substitute others not spaced, and we will have a much better alphabet than either the European or the present Morse system, and we are sure that it will give general satisfaction to all concerned. Of course there will be a few sore heads to grumble, it matters not whether a change is made or not. The greatest good to the greatest number should be our motto.

E. DUDLEY.

WINTHROP, June 23, 1873.

To the Editor of the Journal of the Telegraph:

"Experientia Docit" (why so euphonious?) will find that the statement made in my last communication is substantially correct. The Morse (by the way, why is it called the Bain alphabet? Is it because it was first used on a Bain instrument?) alphabet had been in use some years before 1857, on the single needle dial instrument, in England and Scotland, and was therefore known to every operator in the service. When it was decided to introduce the Morse, or, as we there called it, the printing instrument, the order, as stated in my letter, was issued and signed by Mr. Culley, giving us a fortnight to adapt what we had hitherto regarded as the single needle alphabet to the new instrument. Mr. Varley, in his article, refers to the introduction of the change of alphabets in the London Districts, which occurred some months prior to its being tried in Scotland. There was no personal significance intended in my letter. I merely wished to demonstrate that once a change of a code or alphabet is determined upon, it is easily mastered by experienced men. The only objectionable feature of the English edition of Morse is in the figures, and these have for some time been practically substituted by certain symbols on important circuits in England, the letters *Fi* being used to denote commencement of figures, and *If* end of figures. They also used a code for the transmission of fractions from one-sixteenth upwards, and which might be used advantageously in America. As "Experentia Docit" is partial to Latin, you will probably oblige him by allowing me to sign myself, this time,

DAT NOBIS HODIE.

To the Editor of the Journal of the Telegraph:

Your article on the subject of unnecessary office messages is very *apropos* in these days of reform. I favor a strong order prohibiting the sending of a single office message, unless it be a notification of "Can't find," or something similar. Let every customer be informed of the method of obtaining a notification of delivery of his message, have everything properly understood by him, and then he won't grumble.

When the question is asked, "Was my message delivered?" I say, "Yes, sir, or we would have been notified to the contrary." Is this rule carried out to the letter? It should be. And then one would feel that he was giving a correct answer, and that the Company had fulfilled its part. Another thing, the *free* message system: it should be limited. There are thousands of unimportant social messages between operators and clerks that could just as well be sent by postal card, and answer every purpose. When we have an urgent message to send, let it be paid for, say at one-half the usual rate. I would willingly pay for mine. If this course were pursued, the Company would be rid of a leech of huge dimensions, and its receipts increased. I hope some of your numerous correspondents will speak upon this subject.

AN OPERATOR.

STEVENSON, Ala., June 30, 1873.

To the Editor of the Journal of the Telegraph:

It is alleged that A No. 1 operators seldom make mistakes on account of the spaced letters, but they do break each other *sometimes*, but never on words that do not contain spaced letters.

It will never do to adopt the "Continental," as it takes a third more time to transmit a message by it, as can be easily proved by writing messages out in both alphabets and comparing results. If any change is made, I trust some attention will be paid to the interests of a class of men now laboring to perfect improved systems, the success of which depends on none of the letters containing over *four* characters.

MULTIPLE.

To the Editor of the Journal of the Telegraph:

To the question, "Shall we change the alphabet?" I should answer emphatically, No!

Before "X. Y. Z." asked the questions he did, he should have shown, by statistic or something like plausible reasoning, which I have not yet seen in any of the correspondence, that the adoption of the "Continental" alphabet, even were it so easily adopted as some "smart Alecks" would make us believe, or a change to some other kind, would accomplish the desired result. Let it be shown that a majority of the errors arise from spaced letters rather than from careless manipulation of the easier ones, as some correspondent has previously held. I am not at all convinced that such is the case. As the spaced letters require more care, it has become habitual with operators, though I grant you not enough so, to take more pains in their transmission; hence, I think no more errors arise from that than from other causes. It is very easy, and very common too, to make mistakes in unspaced letters, by running together, or by getting the dots too far away from the dashes. I think this occurs quite as often as the other. A case has just occurred, under my nose, where "news" was written "noms." Carelessness, Mr. Editor, is at the bottom of ninety-nine hundredths of the errors.

Does Europe, with her "Continental," do business more correctly than we? If so, is it due, beyond a doubt, to the construction of the alphabet? or is it not rather due to their better system and greater care that pervades nearly every department of industry, coupled with their slow and deliberate modes of doing business, especially in the art of telegraphy, where, if statistics are the guide, and I am not in error, they have never attained, until recently, half the rate of speed of Americans? After having distanced the rest of the world in this art, shall we follow that abominable ancient custom of aping everything European, drop out and go in the rear and be ourselves distanced? If so, let us also ape her in another respect, *i. e.*, "postal telegraphy." Shall America, or I would say, rather, the Western Union Company, turn its back on its several hundred operators, who have not only no superiors, but not even an approximate to equals, on the face of the earth, and make out of them only first-class plugs? For, I assert it boldly, not one in fifty would ever attain to the proficiency in their new alphabet that they enjoyed in the old. The Western Union corps of superintendents, as a general thing, are among the very best of these skilled men, which, I take it, is the very basis, or at least the first consideration, of their fitness for the positions they hold. Would these gentlemen, in this respect so well fitted for the place, ever become respectable operators with the new alphabet? Have they time to practice it? It appears to me it would be easier for an entire green hand to learn it than a first-class operator, for he must unlearn the old. Some correspondents say, substantially, it can be mastered in a day. Try, then, a "whack" at about thirty-five or forty words a minute, if its practicable to transmit that alphabet so fast, and see what he will do with it, and give him six months first to practice it. Changing the alphabet, Mr. Editor, would be a very doubtful and a very dangerous experiment. Try the simpler one, which I think is well nigh infallible, for the present alphabet can be used with absolute correctness, with "just a little" care by fair operators. Require proper formation of the characters. Require them to undergo examination. If in their daily practice they are found uniformly incorrect, or hard to read, send them to a fifth rate railroad station, or some other unimportant post. I apprehend that nearly every man who can manipulate at all, can, with a little pains, do it so that it is impossible, without design, to misread it. During twenty years of experience as an operator, etc., I have found very little trouble from the cause complained of, except, as correspondent G. says, the letter "Z," and I have got along very well even with that.

Can it be sustained, Mr. Editor, that the alphabet is very faulty, when it has often been the case that fifty and probably a hundred messages have been transmitted at a rapid speed, without stoppage, and without a break or a bobble, without a word of repetition, and *without a "bull?"*

I desire to ask, also, why the universal mode of handwriting, so full of similar faults, has never been changed? Is there anything in our alphabet half so conflicting as the *u* with the *n*, the *o* with the *a*, the *i* with the *e*, etc., etc.? Yet, by a little care, these are made perfectly plain.

I have not touched upon the "good" of our alphabet, but rest contented after endeavoring to show that it has not all the faults attributed to it. This accomplished, it is very apparent that it excels any other by being faster and more euphonious. Should the Company have "change" on the brain, and must do it, change only the objectionable letters, and, as it appears that it is for the future that so much concern in that respect is felt, be not in a hurry, but "make haste slowly."

TEXAS.

PRAIRIE CITY, June 30, 1873.

To the Editor of the Journal of the Telegraph:

Like many others, I am very much opposed to changing our good old "Morse" alphabet for *any other; decidedly* not for that clumsy collection of characters termed the International or European alphabet. I cannot see where the gain comes in, unless it be as A. J. L. says, in his communication to the JOURNAL of 16th instant, *i. e.*, "an improvement in the quantity of plugs." There surely can be no greater speed attained in transmitting than is reached in using the "Morse" characters. Now, if there really must be a change made, let it be in the spaced letters alone. Methinks it would save a great deal of time and blundering, as well as expense. In my opinion, we had better let well enough alone. We have a good thing already, and I say let us hold to it

MCGINNIS.

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BURLINGTON, N. J., July 7, 1873.

To the Editor of the Journal of the Telegraph:

Can I speak in meeting? If so, I will contribute my mite for the cause. Twice a month you lay before me the alphabetical case, both pro and con, and am glad to see so much spirit manifested in regard to it. After reading both sides of the case, I find the generality of correspondents are viewing this matter in the same light that I do, that is, in favor of the "Morse." It is sad enough to bury the man, least of all the memory. If we wish to perpetuate his fame, let us not bury his works, which remain as a greater monument than can be hewn from stone or cast in bronze.

I have been at this business some nine years, and find that if we are careful in manipulating the spaced letters in our alphabet that they can be copied down with as much, if not more, facility and correctness than the "European." When you come across a bull, you will generally find a bull-head the instigator of it. It is not the fault of the alphabet—it's the incompetency of the operator. If the Company should adopt this system, it will have to be responsible for a great deal of inward profanity. The first day of such a change would clog business dreadfully, and most likely force the "Morse" back again on certain through wires, to get business cleared. It wouldn't be very acceptable to the public to have to notify them that, on account of the change, their messages would have to undergo a delay, time indefinite. Such would be the case in some offices. There is something very pleasing and musical in our spaced letters, which the true sounder would be able to appreciate if the cumbersome Johnny Bull system came into vogue. There is also grace and symmetry in our alphabet, which, upon adoption of the new, would vanish. I predict bulls innumerable. If this bullish system is adopted, there would be about one of every ten operators who would or could learn it perfectly, and those who have it imperfectly, will, every once in a while, unconsciously, mix the old with new, and make confusion worse confounded.

"Prescott," in his letter to your JOURNAL, dated "Vienna, April 18th," says: "There is none of that hurry and bustle we see at home." I would infer from that that those phlegmatic Germans were slow of movement, and hence the cause—their alphabet. It is an alphabet you cannot very well hurry, for if you do, it will make your dashes into dots.

The contemplated change would involve railroad lines, and I am sure there will be but few who can risk a change, especially where they employ their agents to do the telegraphing.

If there is to be a change, let it be in the "Morse." We can better stand modification than abolishment.

If the correspondence carried on through your valuable paper is not taken as the true sentiment of the American operators in general, suppose there be a vote polled upon the subject, the Company to furnish each operator with a double ticket, one with "Morse" or "American," and the other "European," printed on the face, and let each operator forward his vote to his district superintendent, and the result from him to General Eckert, New York. Let there be a day appointed when voting will cease and polls closed, and three judges appointed by the Company to receive the returns and decide. I would guarantee that the vote would be almost unanimous for "Morse."

You may think this would be unnecessary trouble for a small end, but I think the opportunity would be eagerly seized upon by those who are not accustomed to penning their ideas upon paper to give expression on this subject. A.

STUPIDITY, OR WHAT?

To the Editor of the Journal of the Telegraph:

Now that the Company are considering the necessity of reducing free service messages to the lowest possible number and length, we submit below copies of two office messages passing between offices 1,500 miles apart; and would ask if such accommodation service pays, the present low tariff considered?

Enquiry: "Can you deliver message Rodolpo Pirjeon, 93 Old Levee street, is such a party there? Answer quick."

Reply: Yes, we can deliver message to Rodolpo Pirjeon."

Twenty-six words of office correspondence.

N. O.

VERGENNES, VT., June 25, 1873.

To the Editor of the Journal of the Telegraph:

How many words in the following message:

To Edward Page & Co., 22 William St., New York.

Are trying to get boat. How much more time can we have? (Signed) J. G. HINDES, Agt.

I claimed there was 12 words, while repeating office declined to receive it unless "agt." was counted one word, making in all 13 words. Mr. Hindes was standing by at the time, and I told him that "agt." must be counted. "Very well," he says, "make the signature 'National Horse Nail Comapny' instead of 'J. G. Hindes, Agt.,' if that suits him better," which I did, and the repeating office was satisfied with that and made check 12 words. Now I fail to see where the saving comes in. It seems to me that simply the words agt., sec'y, treas. or cash'r, affixed to a signature, would be much better for the Company (and save time in transmission) than to give the full name of a firm, company or bank, which are in many cases long, but cannot be counted as part of message. Please give your views in JOURNAL. I have not seen a case that is exactly like this. J. S. HICKOK, Manager.

Answer.—There are thirteen words in the message given. The question is not one of money making on the part of the Company, but is instituted as a protection against abuse. Any legitimate signature, however long, will be transmitted free under the rules, but any addition, conveying information, should be counted as part of the body of a message and charged for.

To the Editor of the Journal of the Telegraph:

Supposing a party should "get wind" that another party purposed sending a message to a third party at some other place that would be a serious damage to first party, and said first party should forbid me sending such message in case it was presented; would I be upheld in sending such a message, providing sender tendered money for same. Please answer through JOURNAL. "QUERY."

Answer.—You would not be upheld in refusing to transmit any message for which payment is tendered; the construction of which conforms to the rules of the company. You may safely disregard the prohibition of the party who has "got wind," or any one else.

MONROE, June 24th, 1873.

To the Editor of the Journal of the Telegraph:

Please answer this in your next issue: "When an operator gets a per cent. instead of a salary, is he compelled to pay anything but a per cent. on deficits?" Say he gets three-fourths of gross receipts, has he a right to pay anything more than three-fourths of gross deficits? B. W. M.

Answer.—Under these circumstances it appears to us that he should be liable for one-fourth only of the gross deficits.

To the Editor of the Journal of the Telegraph:

I would like to know the proper way of checking a message as follows: When a message is sent to me from any office "collect" to a certain party, and after searching, I find that the party has gone to another place, and I forward the message to him, "Collect," which is, of course, the tariff from the first office to my office, and the tariff from my office to the destination. Now, how is the proper way for me to check the *first* office, and for him to check me? SYLVESTER.

Answer.—Check yourself with the amount to be collected for the first service, and on the second credit yourself as having paid the same amount to "other lines." See reply to L. C. Orvis, in JOURNAL of December 16, 1872.

J. J.—Fac simile telegraphs have been invented by Bakewell, in England; Casselli, in Italy, and by Meyer and Lenoir in France. None of them, excepting Meyer's, have been put to practical use; and this, after working for some time at a few stations in France, has been abandoned.

A.—There are fourteen words in the following message:

"Miss Jennie Green,
with Montgomery & Sons,
Hurricane, Miss.
care Scharff Bros.,
Vicksburg, Miss.

Come immediately—your mother is taken with paralysis."

The words "with Montgomery & Sons, Hurricane, Miss.," should be charged for.

There is nothing arbitrary in this rendition. There is an extra address; it cost something to send it, and that cost should be defrayed by the sender and not by the company.

B.—See answer to A.

J. M. D.—When you receive a free message for a person living three miles distant from your office, without instructions as to delivery, it is your duty to notify the sending office of the cost of delivery and await instructions. Exactly the same course should be pursued with a paid message.

C. B. SKEGGS.—There are ten words in

"Dr. Meeker was in the office this morning,
Wm. M. McPherson,
P. M."

P. M. should be counted.

J. W. K.—When a message is received for delivery by special messenger, charges guaranteed, you are to collect the amount from the party addressed. Failing to do so, notify the sending office and he will collect the amount from the sender of the message. It should be borne in mind that the charges must not exceed the actual cost of the service.

J. S. C.—There are sixteen words in the following:

"Send me, without fail, by express to-morrow, a new pitman. Last you sent broke.
(Signed,) ——
Answer quick."

L. A. HUNTINGTON.—There are twelve words in "Meet me with Coupey 42d st., 8:15 train, to-night, Monday." Figures should be counted for as many words as they contain when written out. You should not, however, have accepted the message in the form given. See Rule 6, of the book of regulations.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
July 15, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

The tariff to points on the International Ocean Telegraph lines south of Lake City, Fla., will hereafter be as follows, in addition to the rate to Lake City, from all offices north of Lake City.

Baldwin.	50	4	Ocala.	100	7
Bartows.	100	7	Pine Island.	150	10
Branch River.	150	10	Punta Rassa.	150	10
Caloosahatchie River.	150	10	St. Augustine.	50	4
Gainesville.	50	4	Sanderson.	50	4
Jacksonville.	50	4	Sumterville.	100	7
Key West.	400	30	Tuckertown.	100	7
Newnansville.	50	4	Palatka.	100	7

Bear Creek, Ga., changed to Hampton.
Pleasant Valley, Idaho, re-opened.
Old Orchard Beach, Me., re-opened.
Pigeon Cove, Mass., re-opened.
So. Weymouth, Mass., closed.
Weymouth, Mass., closed.

There is now a W. U. office at Falmouth, Mass., square 18 check direct.

Clark City, Mo., closed.
Summit, Mon., closed.

Herreafter the "Tariff for Other Lines" to Bullionville, Nev., will be 50 and 5 from Pioche City, Nev.

Boars Head, N. H., re-opened.
Farragut House, N. H., re-opened.

Ocean House, Rye Beach, N. H., was destroyed by fire. Messages addressed simply Rye Beach, N. H., should be checked to Farragut House.

Messages may be taken for Little Boars Head, Jenness Beach and Frost's Point, N. H., to be delivered from Farragut House, N. H. Charges for delivery, 50 cents.

Deal, N. J., re-opened as a W. U. office; square 47. Check direct.

Cascade, N. Y., closed.

The W. U. office, at Bloomfield, O., square 170, printed in the tariff book, is in Jefferson Co., and Bloomfield, the new office on Other Lines published in JOURNAL of June 15, with tariff from Youngstown, O., is in Trumbull Co.

Smysers, Pa., closed.

Business for Lykens, Pa., will hereafter be checked direct.

Pleasant Valley, Luzerne Co., Pa., closed.

Manayunk, Pa., the W. U. office printed in tariff book, is in Phila. Co.

Watch Hill, R. I., re-opened. Tariff same as heretofore.

Tiverton, R. I., re-opened. Check direct.

The following Summer offices in Virginia are re-opened:

Healing Springs, Rockbridge Baths,
Hot Springs, Sweet Chalybeate Springs,
Jordon's White Sulphur Springs, Warm Springs.
Rockbridge Alum Springs.
Old Sweet Springs, W. Va., changed to Sweet Springs.

NEW OFFICES.

60 Delmar, Del.
237 Hampton, Ga.
359 Chester, Randolph Co., Ill.
307 Grayland, Ill.
358 Nebo, Ill.
307 Oswego, Ill.
238 Steel's Mills, Ill.
397 Dean, Iowa.
* Fort Point, Me, 25 2 11 Stockton.
25 Oxford, Mass.
18 Wareham, "
118 Frankfort, Mich.

The Tariff to square 118 is the same as to square 119, with the following exceptions:

Between square 118 and—

Square 100	50	Square 210	75
" 108	50	" 220	75
" 119	40	" 230	50
" 127	75	" 240	75
" 128	75	" 250	50
" 137	50	" 260	50
" 138	75	" 269	40
" 147	75	" 279	50
" 148	75		

270 Watervliet, Mich.
388 Cahoka, Mo.
398 Clifton, Mo.
47 Asbury Park, N. J., P. O. A, is Ocean Grove P. O.
57 New Hartford, N. Y.
2 Maitland, N. S.
213 Manchester, O.
121 New Bethlehem, Pa.
76 Tower City, Pa.
292 Greenbrier, Tenn.
510 Van Alstyne, Texas.
103 Doe Gulley Tunnel, W. Va.
152 Flemington, W. Va.
122 Green Spring Run, W. Va.
141 Tunnelton, W. Va.
* Rowley Springs, Va., 85 6 77 Alexandria, Va.
143 Sweet Springs, W. Va.
297 Francksville, Wis.
297 Lake, Wis.

Everson, under head of New Offices, in last JOURNAL, should read Everson, Pa.

Offices having "special sheet A," will check Tower City, Pa., 35 cents more than "special rate" to Philadelphia. Present square rates not to be increased.

The arrival or departure of Ocean steamers at Sandy Hook, N. J., can be reported to any office of this Company, at any time during office hours, for $1.00, in addition to tariff on the message from New York to the place of destination. Managers should note this fact and inform parties desiring such reports.

Applications should be addressed, Manager, Quarantine, S. I., and if sent by telegraph, should be paid for.

ATLANTIC CABLE BUSINESS.

We are notified of the following change in rates on Atlantic Cable business to points given below:

Greece—Via Turkey	$2 25
Spain—Via Falmouth	2 00
Japan—Nagasaki, via Falmouth, Teheren, or Siberia	40 38
Japan—All other places, via Falmouth, Teheran, or Siberia	43 00
China—Amoy, Hong Kong, Shanghai, via Falmouth, Teheran, or Siberia	30 00
Russia, in Caucasus	3 12
Russia in Asia, West of Tomsk	4 16
" " East of Tomsk, and West of Werkline Ondinsk	5 82

The Japanese Government charge double rates over their lines for telegrams which are not written in the English language, addressed to places in Japan, other than Nagasaki. An extra charge, therefore, must be made for these messages of $2,62 for 20 words, and half-rates for every additional 10 or fraction of 10 words.

We are also notified that messages forwarded by private persons to the Ottoman Empire must be written in plain ordinary language—code or cypher not being allowed.

The Cable between Trinidad and Demarara, in the West Indies, is broken, and messages for Demarara are now delivered from Trinidad by steamers on 6th and 21st of each month.

WILLIAM ORTON, *President.*

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, July 11th, 1873.

On and after July 15th, Brookville, Pa., will be added to the list of Money Order Offices in C. O. Rowe's district; and Dunbar, Pa., in same district, will be closed as a Money Order Office.

G. H. MUMFORD,
Vice-President.

AMERICAN CENTRAL TELEGRAPH COMPANY.

This company was recently organized at Davenport, Ia. The capital stock is to be $1,000,000, of which five per cent. is to be paid in at once, and the rest in instalments as called for. Edwin S. Chamberlain, G. A. Rhodes, Jr., and A. C. Stedman are the directors for the first year.

The steamers Kangaroo and Edinburgh arrived at Placentia, Newfoundland, on Sunday morning, July 13, with cable on board for two lines between that place and Sydney, Cape Breton. The Edinburgh came into collision with an iceberg in a dense fog off Cape Race. Her bow gear was damaged but the ship was not much injured.

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

The acknowledgment of receipt of any assessment is to be understood as an acknowledgement for all previous assessments:

ACKNOWLEDGMENTS OF RECEIPTS FOR ASSESSMENTS NOS. 42 AND 43, UP TO AND INCLUDING JULY 10TH.

8	13	22	25	26	30	41	42	44	53	55
61	70	75	80	89	97	98	108	111	114	120
134	141	142	144	153	154	156	158	160	164	166
169	179	181	182	189	190	191	193	197	198	200
218	227	230	231	244	247	257	267	288	297	301
303	311	353	357	359	361	362	364	366	379	382
385	388	392	393	406	411	412	425	428	429	430
431	433	438	441	456	463	476	482	484	494	495
496	497	499	500	503	504	505	506	507	508	511
512	515	548	555	556	557	561	575	577	584	590
592	600	602	628	630	632	642	648	649	655	662
663	664	665	569	670	692	694	701	702	710	717
723	724	728	729	735	737	738	743	750	751	756
764	772	773	778	780	781	782	783	785	786	790
798	802	808	809	823	831	836	838	841	842	876
897	901	905	906	916	920	926	927	931	938	943
944	949	952	954	955	956	957	959	960	963	964
977	979	980	991	992	995	998	1000	1002	1009	1011
1014	1016	1024	1028	1041	1042	1044	1048	1055	1063	1073
1074	1075	1076	1080	1084	1085	1087	1100	1101	1104	1127
1139	1141	1152	1155	1156	1157	1159	1160	1162	1169	1182
1185	1190	1196	1204	1207	1211	1221	1222	1131	1234	1235
1248	1255	1256	1262	1266	1268	1269	1281	1282	1283	1284
1285	1286	1287	1288	1289	1290	1294	1325	1333	1339	1340
1342	1344	1346	1348	1349	1350	1351	1352	1353	1354	1355
1360	1366	1371	1376	1383	1385	1387	1389	1390	1391	1393
1294	1398	1405	1406	1412	1413	1416	1417	1418	1426	1427
1430	1431	1432	1433	1457	1458	1459	1461	1462	1464	1465
1466	1468	1469	1470	1471	1474	1475	1476	1477	1491	1483
1495	1498	1502	1503	1505	1513	1514	1517	1526	1537	1546
1551	1563	1564	1572	1580	1582	1585	1586	1609	1614	1616
1619	1620	1622	1625	1633	1644	1646	1647	1649	1652	1665
1667	1673	1684	1685	1687	1688	1896	1699	1700	1701	1702
1704	1707	1709	1710	1711	1713	1714	1717	1719	1720	1721
1723	1724	1726	1727	1728	1730	1732	1733	1734	1738	1742
1746	1747	1749	1762	1764	1765	1766	1767	1777	1781	1785
1787	1788	1789	1791	1792	1793	1794	1796	1798	1799	1800
1807	1808	1813	1814	1817	1825	1827	1828	1830	1331	1837
1838	1839	1840	1841	1843	1847	1848	1854	1860	1872	1874
1875	1876	1877	1878	1879	1880	1882	1883	1884	1903	1912
1915	1918	1920	1923	1924	1925	1927	1938	1958	1966	1967
1968	1977	1982	1984	1992	1993	1996	1997	2014	2015	2016
2017	2018	2020								

W. W. Cummings has been appointed agent at St. Louis, *vice* J. P. Cassidy, resigned, to enter other business.

A NEW THERMO-ELECTRIC BATTERY.

A new form of this battery, recently invented by Mure and Clamond, consists of sixty pairs, made of iron and lead, and the electro-motive power is equal to two Bunsen elements. By the use of thirty-nine gallons of gas, about two drahms of copper were precipitated in an hour, the surface of the electrodes being eleven square inches, and their separation from one another 0·4 inch. The cost of depositing 2 2-5 lbs. of copper by this battery, in Paris, where gas is sold at three cents per thirty-five cubic feet, would be $2.36.

The largest battery which has been as yet constructed upon this plan consists of 150 large pairs, and has an intensity equivalent to five Bunsen cells of medium size. A battery of 560 small pairs, arranged for tension, have an intensity equal to sixty Daniell cells. In both cases, the gas consumed is about 210 gallons per hour.

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FOREIGN TELEGRAPHIC ITEMS

PROGRESS OF THE BRAZILIAN CABLE.

The Government of Brazil has lent the steam corvette, "Vital de Oliveira," commanded by Captain Mello Tamborin, for the service of effecting the soundings along the Brazilian coast, preliminary to laying the telegraph cable, for which the concession has just been granted to the Telegraph Construction and Maintenance Company of London, which is also to lay the transatlantic cable, and acts with the Brazilian Submarine Telegraph Company and the Great Western Telegraph Company. Major Wood, the representative of the latter company, is still in Rio Janeiro, and will superintend the engineering of the coast cable, and the sounding apparatus has already been ordered by him from England, together with a staff skilled in its employment. The work of sounding will be commenced shortly.

The transatlantic cable will be laid next year, but the Coast Cable Company is only bound to lay the Rio and Pernambuco section, or the Pernambuco and Para section, within three years, and the whole within five. The concession covers the whole seacoast of Brazil, so that the company can join on at the north and south with lines from other countries, such as the River Plate system, and that being laid from the West Indies to Demerara. The Government land lines are progressing, and the communication between Pernambuco and the south of the Empire should be complete by the end of this year.

TELEGRAPHY AT THE ANTIPODES.

The Melbourne *Argus* reports the following news from South Australia:

A party is (May) about to be dispatched, under the command of Mr. Richard Knuckey, to the Roper River, North Australia, by steamer, to errect iron poles along the line of the overland telegraph. Poles to the number of 1,000 have already been landed there, and more are to be shipped from Melbourne. The party will have to erect 4,000 between Elsie Creek and a point thirty miles south of Tennant's Creek. Arrangements have been made for the substitution of iron poles for alternate wooden poles on the section immediately south of Port Darwin. A quantity of poles has been sent inland by teams which started from Port Augusta, and steps have been taken to provision the different stations, some for nearly two years, others for nearly three years.

THE INTERCOLONIAL AUSTRALIAN CABLE.

An agreement for the construction of a cable from New Zealand to New South Wales, and from Normantown to Singapore, has been signed by the conference representatives of New South Wales, Queensland and New Zealand. The agreement is to the effect that these colonies shall guarantee five per cent. upon one million pounds for thirty-five years, on condition that the cables are constructed for that sum. Receipts of over twelve thousand pounds go to reduce the guarantee. The arrangement will effect a reduction of thirty per cent. on the rates charged for messages *via* Singapore, as compared with the Java cable rates. Mr. Audley Coote, agent for the Indo-European, Atlantic and other leading telegraphic companies interested in the construction of the cable, has been instructed to accept the proposals of the delegates for the construction of the line. The tariff of charges is as follows: From New Zealand to New South Wales, not to exceed 15s. for twenty words, and 9d for each additional word; from Normantown to Singapore, 40s. for twenty words, and 2s. for each additional word.

THE NEW TELEGRAPH SHIP.

In the *Telegraphic Journal*, for February 15, it was announced that the directors of Hooper's Telegraph Works had ordered a steamer to be built expressly for the purpose of reducing the expense and lessening the risk of submerging telegraph cables. On Wednesday, June 11th, a party of scientific gentlemen assembled at Millwall Docks to inspect this new vessel. She is 350 feet in length, 55 feet beam, and 36 feet in depth, and of 5,000 tons gross register, with engines of 400 nominal horse-power working up to 2,000, and realizes, though not intended for speed, 10½ knots an hour. Being the first vessel ever constructed entirely for telegraphic purposes, her tanks, which are only three in number—huge cylinders, 30 feet deep and 53 feet wide—so far from being a source of weakness, really strengthen the hull; while the paying-out machinery, and the appliances for picking up a lost or damaged cable, embrace every improvement which experience up to the present time has suggested. The vessel is now taking in 1,500 miles of cable directly from the Hooper works, at Millwall, belonging to the Western Telegraph Company, which is about to lay 2,500 miles of cable along the east coast of South America. The work will be performed in three sections, the first, that which is now about to be despatched on board the "Hooper," being laid from Pernambuco to Rio de Janeiro, the second from Pernambuco to St. Thomas and the third from Rio to Montevideo, taking in all the intervening South American ports. After inspecting the works of Hooper's Telegraph Company, the party adjourned to the vessel—a noble, though somewhat unsightly, craft—much interest being felt in the perfect electrical testing cabin, fitted up at the suggestion of Sir Wm. Thomson, who, with Mr. Latimer Clark, represented science on the occasion, and showed the means by which signaling and testing for insulation can be carried on at the same time.

By the last mail from Melbourne, Australia, information has been received that two new telegraph stations have been opened on the coast—one at Wilson's Promontory, which has long been required for the shipping between Sydney and Melbourne. Vessels by way of Sydney can now be telegraphed twelve hours before arriving at the Heads. The other station is at Cape Jervis, on the South Australian coast.

The success in laying the new Atlantic cable has created a strong demand in London for the Anglo-American and French cable shares.

The telegraph cable between the island of Cuba and Porto Rico is in working order again.

The Mexican telegraph line between Minatitlan Vera Cruz has been completed.

The New York, Newfoundland and London Telegraph Company announce that the register of transfers will shortly be closed, for the purpose of the amalgamation with the Anglo-American Telegraph Company. The exact day will soon be given.

The total number of messages forwarded from postal telegraph stations in the United Kingdom, during the week ending June 14, 1873, was 339,772—an increase on the corresponding week of the previous year of 40,815.

The total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ended the 21st of June, 1873, was 341,551; an increase over the corresponding week of the previous year of 37,262.

SUGGESTIONS CONCERNING THE CARE OF REPEATERS.

By Eugene Cadmus.

Telegraphers fall short of perfection in many things, but what many of them don't know about the repeater would make a larger book than some of our voluminous manuals of electricity. The repeater plays so important a part therein, that its management, if not properly done, is one of the most annoying and disastrous obstructions to the working of long circuits.

Here, then, is a chance for the diffusion of usefu. knowledge. Let some of us, who think we know how it should be done, try our hands as an advisory board upon the management of the repeater.

Speaking, now, with reference to the Milliken instrument—that manufactured by Mr. Phelps, in New York—there are those who have lived to learn that it takes the nitric acid, or Grove, cell as local battery to develop the full effectiveness of the instrument.

Those who persist in using other forms of local battery are liable to have sarcastic remarks addressed to them about their "old trap." But the wise managers trim their repeaters with two cups of Grove battery on the regular local, and one on the extra, and when they are going to be up all night, they replenish the nitric acid twice each day, using the spent acid in their main batteries. Greater uniformity in the working of the instrument is maintained thereby.

Both economy and convenience would be subserved if, in cases where a set of repeaters are only used occasionally, the required amount of nitric acid for a cell was put in a small glass-stoppered bottle, and enough prepared solution to fill the tumbler in a larger bottle. Let the battery be set up dry, with all the connections made, and one of each size of bottle placed handily by each cell of the local battery. Very quickly and neatly could the batteries be put in action when, late at night, or to supply an immediate and pressing necessity, the repeater is needed.

Experience has taught that the armature of the small coils of the relay needs adjustment but seldom if the locals are in proper order. It is as natural for a greenhorn to dive for that upper spring as a duck for sunken corn; and some won't believe that the relay is to be treated as an ordinary relay would be.

The lever of the sounder is better adapted for sledge-hammer movement than that of the relay, and is rendered rather more effective thereby. Perhaps 3-16 of an inch is not too much play, and here is the prime feature of the sounder, viz.: Let the tension on the lever be only moderate—a little more than enough to draw it up. It is utterly impossible to work well through a repeater, whereof the sounders are adjusted to sound as light as many operators prefer. When most efficient it usually sounds as if it dragged slightly. With their relay properly adjusted, they need not fear that the opposite side will be unable to break.

Tight thumbscrews, clean points, and each pole of every magnet equidistant from its armature, conduce to the best results.

If operators would realize that it is best to throw the circuit open for about two seconds when they wish to break through two or more repeaters, it would be well.

This, and much other theoretical knowledge of this instrument, will be required when we have examining boards in the telegraphic service.

Washington, D. C., July 7th, 1873.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,

Western Union Telegraph Company,

145 Broadway, New York.

NEW YORK, JULY 15, 1873.

SUPPLEMENT TO THE JOURNAL.

The supplement which accompanies this issue of the JOURNAL contains all the changes in tariffs which have occurred since the last book of rates was issued, in October, 1872. It includes the subject-matter of the Supplements issued September, 1872, and March, 1873. Managers should compare their books with the Supplement, and make a careful revision.

STUPIDITY, OR WHAT?

In view of the instructions, many times given in the JOURNAL, concerning the transmission of unnecessary office messages, it is hardly possible to believe that stupidity and inattention can exist to the extent indicated by the communication of N. O., which will be found in our columns of correspondence of this issue. It is evident that a classification of managers and clerks, as well as operators, would result beneficially to the Company.

THE NEW ATLANTIC CABLE.

The shore end of the new Atlantic cable was successfully laid on the Fourth of July from the steamship "Hibernia," and the communication is perfect between Heart's Content and Valentia.

TELEGRAPHERS throughout the country will confer a favor by sending to this office any item relating to electrical or telegraphic progress which may come under their observation. Many items frequently appear in local newspapers, which would be interesting to the craft at large, which we would gladly reproduce in the JOURNAL for their benefit. The JOURNAL aims to be a complete compendium of the progress of electrical science and telegraphy, and its friends can render material aid in maintaining its high standard Their assistance will be received thankfully.

MANAGERS will please observe the notice in the tariff circular, by which parties throughout the country can receive information of the arrival of vessels off Sandy Hook at a fixed rate.

LET TELEGRAPHY BE TAUGHT IN THE PUBLIC SCHOOLS.

The great moral power of the nation is attributable, beyond a doubt, to the system of State education for the masses, and it is equally certain that in the educational intelligence of the people lies the strength of our peculiar form of government; hence it is desirable that no useful knowledge should be withheld from the youth of both sexes who now attend the public schools. The theory of our institutions, that all classes are equal, and that the children of the poorer classes shall receive the same privileges in education as those of the rich, while sound on general principle, is not unmixed with evil, and to the course of studies at present pursued is directly traceable many of the crimes which now outrage society. It must not be understood, however, that we attribute these evils to the fact that education is open to all; it is rather to the fact that the education given is aimless. The children of the rich and of the poor are upon a very democratic level while at school, and finally graduate with the same general acquirements in knowledge; and if in society education and personal merit were alone the requisites of *social* equality, nothing could be better than the present system. We are aware that upon this assumption is based the system of common school education, but there is a radical fault in not carrying the instruction to a proper and legitimate conclusion.

Upon leaving school and entering into the active business of life, the graduates are no longer socially equal. The riches of the comparatively wealthy enable him to enter into a pursuit for which he is qualified by taste and education, and which is ultimately certain to still further advance his pecuniary interests, and finally result in a competence, and, it is to be presumed, all the worldly happiness attainable. The poor person returns to the social condition from which he emerged, and from which he has no hope of escape, owing to the want of means to place him in a position for which he, by education, has become qualified. For a while he follows some humble calling, until, overcome by discontent, intelligent roguery receives another recruit, and society at large is made to suffer.

Now this condition of affairs can be remedied, to a great extent, by giving aim to study. It is worse than useless to educate a person for a sphere of life which there is little probability of his filling. It serves only to engender disgust and determination to escape from his unhappy position in any manner. Why cannot the teaching of some useful and honorable business be incorporated into the studies pursued at our common schools? At present there occurs to us three professions which could properly be taught—Telegraphy, Civil Engineering and Book-keeping. Either of them could easily be acquired by an intelligent scholar. All are of the first rank as business pursuits, and each needs a greater amount of first-class talent than it now possesses. Here are fields of honor and usefulness for many who, without such advantages, may find that the well-intentioned efforts to advance their positions in life by education, has served only to produce moral degradation.

We desire to speak more particularly of the telegraphic business. Telegraph companies are always in need of good operators, the supply being never equal to the demand. Of poor and indifferent operators there is, and probably always will be, a superfluity.

Many of the better class, from time to time, leave the ranks to engage in other pursuits, leaving vacancies hard to fill, and the expansion and development of the telegraph continually affords opportunities for which there are no competent takers. The vast field of private telegraphs, thus far comparatively untouched, will yet furnish employment to many thousands of persons who, from their knowledge of the art, will command situations in preference to those who lack that knowledge, and at higher salaries.

The telegraph companies are in continual receipt of applications for positions from persons of finished education, graduates of universities, whose services, did they possess the ability to manipulate the telegraph, would be very acceptable. Had these persons been taught telegraphy they could at once have passed from school into well paying situations, where future progress is limited only by capability. If telegraphy should be taught in the public schools, the result could not but prove beneficial to the companies and their employés. Better work would be performed, and the business be elevated. Operators of ability, now in the service, would find their positions improved, while those of inferior skill would feel the necessity of putting forth every effort for improvement, in order to keep step with the progress of the times.

Good penmanship, a knowledge of the elements of grammar, and a proper idea of punctuation, are essential to the first-class operator. The telegraphist of the future will possess these acquirements, for, without them, he will be deemed incompetent to fill any position upon the lines.

THE INTERNATIONAL PATENT RIGHT CONGRESS.

Notice is given in the Vienna journals that the International Patent Right Congress will commence on the 14th of August. An Imperial Commission has been appointed to arrange the preliminaries. The language used at the Congress will be German, but French and English will be permitted. The decisions of the Congress will be communicated through the several commissions to their respective governments.

Inventors, and proprietors of inventions, are actively moving in the matter, and a large and important gathering is anticipated.

MARIETTA, Ohio, has the telegraph mania. The city is full of short lines from house to house, and more are projected. The ladies especially are interested in learning the art, and they are no doubt preparing for the coming day when, by the magic touch of the key, fair hands will summon papa from the bank or store to his long-neglected dinner, or tell him to bring the doctor for Eddie, who has a sudden relapse of the measles. But we hardly think the ladies will be satisfied with even this pleasing picture of the future. They will never be happy until they can sit down to a telegraph instrument in their parlor, and be in direct communication with all the places wherein a belated husband or brother is supposed to pass his evenings when he goes down street "to see a man."

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TELEGRAPHING TO TEHERAN.

In connection with the visit to England of the Shah of Persia, the London *Daily Telegraph* says: "As might be expected from a monarch of his enlightened views, the Shah has always felt the deepest interest in the telegraph line which traverses his kingdom, and by which he is now enabled to conduct all State business at his capital as well and as speedily as if in his own palace. The line by which this is effected is primarily an Indian line, since it joins, at Teheran, the lines of the Indian Government, one of which proceeds from the Persian capital to Shiraz and Bushire, then entering the Persian Gulf, touches only at an intervening promontory, and continues a submarine line to Kurrachee, a duplicate line being carried from Bushire to the same point overland. Between London and Teheran the Indo-European Company's line crosses the North Sea from Lowestoft to Norderney, and thence to the main land, where it proceeds direct to Berlin, Warsaw, Odessa, the Crimea, Tiflis, Tabriz, or Taurus, to Teheran. With the exception of where it crosses the Straits of Kertch, the line is carried altogether overland. It is possible to work direct from London to Bombay without any retransmission, but the common commercial working from London is direct to Teheran or Bushire; and there was, therefore, no difficulty in keeping the Shah in constant communication with his capital, both at Berlin and in London—a convenience which both the sovereign and the members of his suite fully appreciate and amply use. At Buckingham Palace a special wire has been carried over the roof from the Southwestern District Post-office, at Buckingham Gate, into an apartment adjoining the bed and bath rooms of the Shah. On the night of his arrival, the first act of the Shah was to pay a visit to the telegraph office, and, in consultation with his Grand Vizier, to communicate at once with Teheran. Dr. C. W. Siemens, F. R. S., the principal promoter of the line, was present, and had the honor of an introduction to the Shah, who conversed for a long time with him, and sat by the instrument—cleverly manipulated by one of the best operators of the company, a young German, Mr. O. Moll, who is told off for the service—deeply interested, as sentence after sentence, flashed direct from his capital, was received before his eyes, and transcribed by the Grand Vizier for his perusal. His stay at Guildhall, last evening, was rendered doubly agreeable to him by the same facility being afforded. The Lord Mayor and Mr. Andrews, Manager of the Indo-European Telegraph Company, arranged that a wire should be carried into the library, and attached to an instrument on the dais, in charge of Mr. F. Moll, brother of the operator in charge at the palace, and the address and the Shah's reply were flashed as soon as delivered to Teheran. As, however, the difference of time is three hours and twenty-seven minutes, Teheran being that amount later than London, the communication, of course, only reached the Shah's faithful Regent and Ministers early on Saturday morning, in ample time for easy publication to the population of the Persian capital. This difference in time is somewhat inconvenient for the Prince Governor of Teheran, who had to be turned out of bed when his august master's first London message reached him, and who will clearly have to keep a sharp eye on the British metropolis so long as the Shah or his Grand Vizier is within reach of the telegraph. That great officer had little peace of mind after being disturbed, as he described it, at the fifth hour of the night, for a conversation was kept up between Buckingham Palace and Teheran for three hours. Dr. Siemens was highly complimented by the Shah on the great achievements of his company, and the greatest satisfaction was expressed that the route of the company's line should be through the Persian dominions. However honorable Mr. Moll's post may be, it is by no means an easy one, for his work seems to be almost incessant. He will be a close prisoner during the Shah's sojourn in the metropolis, never being, day or night, beyond the sound of the "calling" of his instrument, which is placed on a dressing table in a bed room overlooking the garden. Long messages pass daily in cipher, on affairs of state, between the Shah and his Grand Vizier and the Prince Governor of Teheran. In addition to these cipher communications on secret matters, a vast number of messages are transmitted in French on domestic matters, their nature indicating that family affection is as warm among the Persians as among other people, and affording another proof, if any were needed, that human nature is very much the same all the world over.

LETTER FROM MR. R. S. CULLEY ON THE PROPOSED CHANGE OF ALPHABET.

The following letter from Mr. R. S. Culley, Engineer-in-Chief of the British Postal Telegraphs, to Mr. George B. Prescott, Electrician of the Western Union Company, containing information of much value regarding the proposed change of alphabet in this country, has been kindly handed to us by Mr. Prescott for publication:

LONDON, June 27, 1873.

DEAR MR. PRESCOTT:

As the change of your spaced letters is still discussed in the JOURNAL (which I always read with great pleasure), it occurs to me that although you already are aware that we in England do not dread change, and have had a somewhat large experience of altered codes, it may hardly be known to your readers how very completely our alphabets have been altered, and how very little inconvenience has arisen therefrom.

We, I mean the Post Office and the "Electric" Company, have had to learn and use the following codes or modes of reading:

1. Double Needle.
2. Single Needle, old code.
3. do do new, formed from No. 8.
4. Bell, old code.
5. Bell, new code, formed from No. 8.
6. Sounder, formed from No. 8.
7. Bain, or Morse, old code.
8. Morse, Continental code.

All our existing alphabets are formed on No. 8.

I have made inquiry, and my own recollection that no important delay, error or inconvenience arose from any one of the changes, although, as you know, several of them were very great, is supported by the recollection of my fellow-officers.

Were it necessary to make a further change, no very great difficulty would be anticipated; *none whatever if four letters only were concerned*, as in your case, epecially if it were known that those letters led to error in the hands of the less careful operators; and it would not, I think, occur to any of our men to object, on national grounds, to accept from you or any other nation anything that was thought good. Indeed, our present code was accepted from the Continental administrations, and although Ireland was, before the transfer, almost entirely worked on the old Bell code, we are now using your Sounder as fast as we can provide apparatus, instead of the Bell.

It may be objected that our system, even now, is not so extensive as yours, and that, therefore, our difficulties would not be so great. But it does not increase the difficulty to *each individual* operator, or at each station, if more individuals or more stations are concerned.

The method we adopted was to give notice, two months or so beforehand, that on a certain date we should work new code in the slacker part of the day, and at a further date, constantly.

The change from 4 to 5 was made in 1871; from 2 to 3 and 7 to 8, in 1856. I think there were changes in a few letters of 7 once or twice before we finally adopted No. 8. If we found two letters were mistaken for each other, they were altered.

Several of our railways have changed from 1 to 3, and without serious difficulty, although the operators were porters and signalmen in most cases.

I give you the three alphabets of the Electric Company, expressing the needle code in Morse characters for convenience. Believe me,

Yours ever truly,

R. S. CULLEY.

G. B. PRESCOTT, Esq.

	2. *Old Single Needle.**	7. *Bain.*	8. *Continental.*
A.	-	-	- —
B.	- -	- — -	— - - -
C.	- - -	— - -	— - — -
D.	- - - -	- - - —	— - -
E.	- —	- -	-
F.	- — —	— —	- - — -
G.	- — — —	- — - -	— — -
H.	- - —	— — —	- - - -
I.	- - — —	- - -	- -
J.	- - — — —	- - — - -	- — — —
K.	- - - —	- — — -	— - —
L.	- - - — —	- —	- — - -
M.	- - - - —	- — - —	— —
N.	—	- — —	— -
O.	— —	- - - -	— — —
P.	— — —	- - — -	- — — -
Q.	— — — —	— - — -	— — - —
R.	— - .	—	- — -
S.	— — -	— -	- - -
T.	— — — -	- - —	—
U.	— - -	- - - - -	- - —
V.	— — - -	— — -	- - - —
W.	— — — - -	— — - -	- — —
X.	— - - —	— - - —	— - - —
Y.	— — - - -	— - —	— - — —
Z.	— - - -	— - - -	— — - -

**Needle.*—Dot to left; dash to right.

BORN.

FERGUSON.—At Somerville, N. J., June 1, 1873, to Robert S Ferguson, W. U. Tel. Co., a son.

MARRIED.

HALL—BROWN.—At Grace Chapel, Watertown, on Wednesday, June 18, by Rev. John A. Staunton, George Hall, of Ogdensburgh, and Helen E., daughter of Lysander H. Brown, Esq., of Watertown.

LATTIME—MARCHBANK.—At Seaford, Del., June 29, 1873, A. W. Lattime, lineman W. U. Tel. Co., of Philadelphia, to Miss Fannie Marchbank, of Seaford.

LELAND—MARTIN.—At the residence of the bride's parents, Rochester, Ind., A. N. Leland, agent and operator at Etna Green, Ind., to Miss Libbie Martin.

DIED.

MERKT.—At Alfred, N. Y., June 26, 1873, Wilfred H. Merkt, son of C. H. Merkt, manager W. U. Tel. office, aged 4 months and 16 days.

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THE SERVICE.

Western Union Telegraph Company.

April, 1873.

APPOINTMENTS.

J. F. Agne.....145 Broadway.
J. C. Burns.....
W. H. Eason..... "
F. C. Hastings..... "
E. Hamilton..... "
W. H. Lyons..... "
G. D. Merrill..... "
L. L. Smith..... "
J. Shepard..... "
W. L. Primble..... "
[illegible] Williamson..... "
[illegible]y Curran..... "
[illegible]. Ford..... "
[illegible]. F. Gardner..... "
[illegible]h..... "
[illegible]ll..... "
Ella [illegible]n..... "
L. J. [illegible]..... "
W. S. [illegible]y.....Broadway & 6th av.
C. K. King.....134 Pearl st.
F. Rostick.....14th st. & 3d av.
G. T. Stanton.....Harlem, N. Y.
H. F. Sarvin.....Littleton, Mass.
C. M. Haynes.....Jonesville, Vt.
C. C. Stevens..... " "
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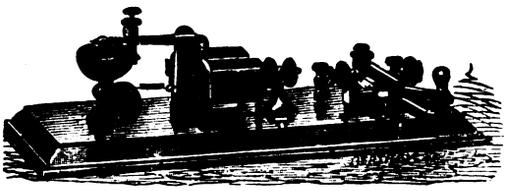
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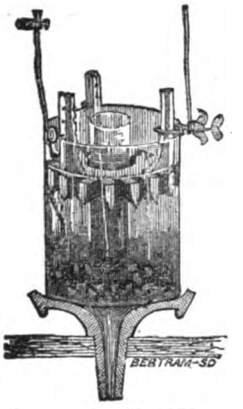
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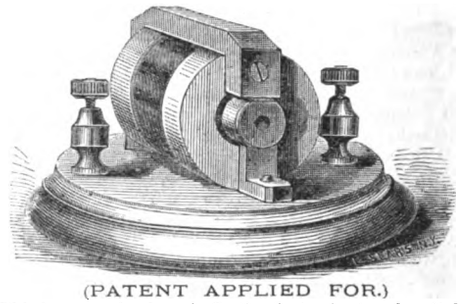
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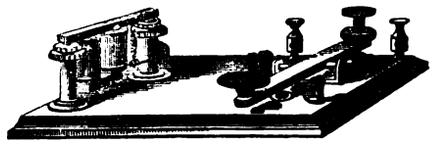
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VOL. VI. NO. 17. NEW YORK, AUGUST 1, 1873. WHOLE NO. 138.

MULTIPLE TRANSMISSION BY THE SAME WIRE.

It has long been known to electricians that the capacity of the wires ordinarily used for telegraphic purposes was greatly in excess of the power or speed of the machinery which is used to operate them, and for many years efforts have been made to utilize these resources. From Gintl to Stearns the way is bridged with experiments, which have finally resulted in practically doubling the capacity of the wires by the duplex system. From Bain to Wheatstone there is a continued succession of endeavors to develop machinery capable of operating the wires by automatic processes to the fullest extent. In some degree the equivalent of an automatic system is that of M. Meyer, of the French Telegraph Administration, a description of which we find in the *Journal Telegraphique*. As will be seen from the following description, nothing which may strictly be termed as new, in a scientific aspect, is claimed, yet the experiment, in its success in utilizing the time which is lost in the working of a wire by a single operator, possesses novelty, and the machinery of transmission considerable merit.

This system of apparatus has for its end the utilization of all the currents which in a given time can be made to succeed each other in a wire, so that several operators, each sending twenty to thirty messages per hour, may transmit them upon the same wire.

The number of transmissions that a telegraph line will carry varies naturally with its conductibility. It is generally admitted that with a speed of twenty-five messages per hour, on a Morse instrument, about five emissions of the current occur per second. Consequently, n being the sum of the currents which in a second can succeed each other in a conductor, $\frac{n}{5}$ represents the number of receivers which it is possible to establish upon a single wire, or the number of operators that can work at the same time.

The apparatus as described, (Fig. 1.) is constructed for four transmissions and is worked by four operators. At a speed of 75 revolutions per minute, presenting four letters at each turn, it records 100 messages per hour with 20 emissions of the current per second. This is less than a maximum result, for experience has shown that telegraph lines can be worked at a much greater speed.

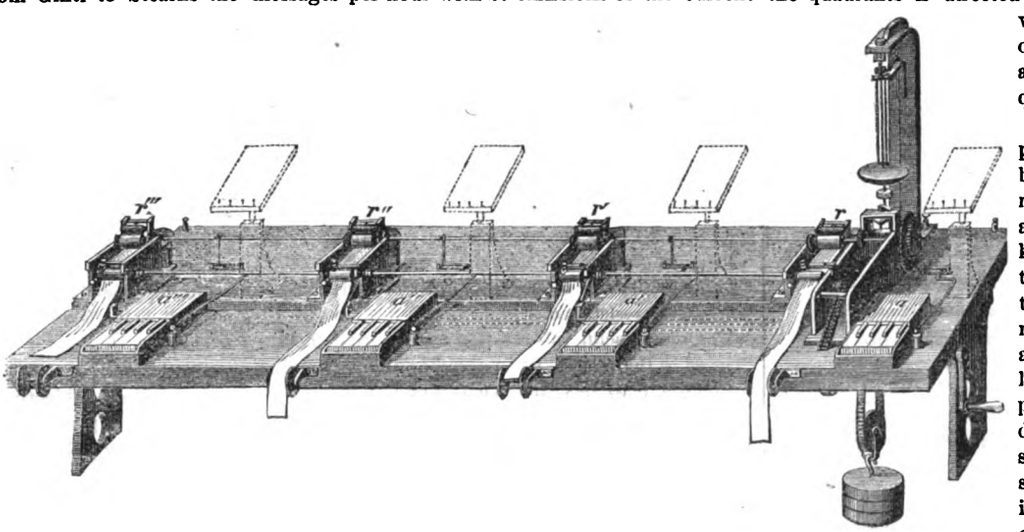


Fig. 1.

As the apparatus is arranged for transmission, four sets of keys, a a′ a″ a‴, eight in each set, are placed with their receivers r r′ r″ r‴ upon a table, each receiver having a strip of paper for recording which is continuously being drawn from a roll. A single clockwork movement, actuated by a weight and regulated by a conical pendulum, serves as the motor of all the receivers. The keys, as well as the receivers, are connected metallically to the earth-wire, and to the line-wire in the latter case, through the "distributor."

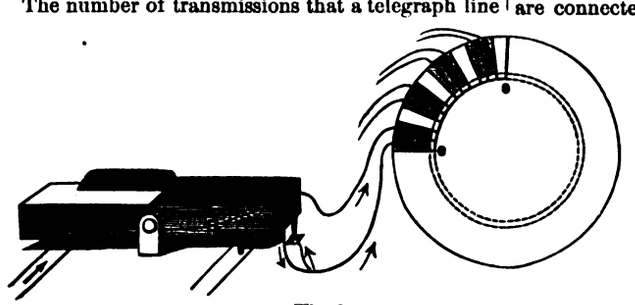


Fig. 2.

The distributor (Fig. 2.) is the principal feature of the instrument. It is this which, in four equal intervals of time, directs the current of the battery successively towards each of the four receivers of the receiving station; o o′ is a disc of metal, fixed and insulated. It has 48 divisions; 12 to the quarter of the circle, of which eight—grouped two and two—are connected metallically by eight wires to the eight contacts of the keys; the others, to the number of four, are permanently connected to the earth. There are, then, four cables of eight wires each which start from the four sets of keys and end in the distributor. The groups or divisions are therefore sixteen in number, separated by intervals. The first half of a group, 1-48th of a revolution, gives place to a short contact; the entire group to one of double the length.

An elastic spring or rubbing contact, mounted on the axis, traverses the circumference of the disc and puts successively the four keys and receivers into contact with the line, so that the current emitted or received during the passage of the spring over one of the quadrants is directed through the receiver to which it corresponds. Each operator thus has the line at his disposal during a quarter of a revolution.

The manipulator is composed of eight keys, four black and four white, connected between the battery and the earth. The black keys represent dots and the white dashes. In order to transmit a letter, as many keys, black or white, are touched simultaneously, as the letter to be produced has dots or dashes, taking care to start from the left key. As soon as the rotating spring, in its movement, passes over that section of the disc to which the keys depressed are connected, the signal or letter is transmitted, the spring passing to the next quarter section which is connected with the next set of keys, and which is being manipulated by another operator, and so on with all the sections. There is, in aid of sending, attached to each of the keys, an eccentric, the use of which is to raise after each letter a small rider, and this, falling by its own weight, produces a tick, beating the measure, during which each operator may work.

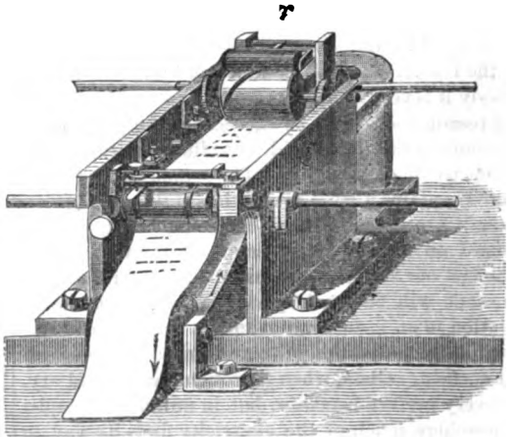


Fig. 3.

Figure 3 is an enlarged view of the receiver. Each receiver has for its printing mechanism the fraction of a helix, resembling an elongated spiral. This

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may be more easily understood by supposing a cylinder having upon its surface a raised bead spirally over the entire length. As the contacts from the sets of keys are placed in a straight line over this cylinder, it will be plain that only one key can be put into connection with the spiral bead at the same time. The helix of the receiver and the rubbing-contact of the distributor make their revolutions in the same time and from the same starting point. An inking wheel revolves freely on each of the helices. The letters appear transversely upon the paper band (*i. e.*, at right angles to the ordinary Morse characters), the paper being raised to the writing-helix by the armature of the electro-magnet over which it passes. This transversal disposition of the letters presents a double advantage : it avoids confusion between consecutive letters, and reduces considerably the length of the paper band used for each dispatch.

The multiple transmission, then, depends upon the identical revolutions in the same time of certain portions of the apparatus at distant stations. This is effected by the aid of a conical pendulum and a regulating system, by which a correcting current is transmitted every second. Further, it is arranged that the line should be put to earth at both extremities after each emission of the current.

It will be seen that the multiple telegraph, arranged upon the best division of the time utilized by successive currents, has nothing in common with the system of double transmission.

THE RESISTANCE OF INSULATORS.

[From the London Telegraphic Journal.]

The resistance of the dielectric or insulator presents some of the most important problems of electro-telegraphy, and it will be impossible that we can exhaust their application until we have attained to some acquaintance with instrumental work. But there are general principles the knowlege of which will tend to the easier understanding of what we shall presently have to say. The specific resistance of insulators varies with every variation in their composition ; and as their composition is necessarily subject to many more variations than are likely to occur with a simple metal, such as copper, the tabulation of a series of resistances would be of little value to the student. Variation in the resistance will occur, too, through difference of age of the insulator, especially if this be india-rubber or gutta-percha ; and difference of temperature results in difference of resistance of insulators to a very large amount.

But were these causes of variation eliminated there would remain a very probable source of error in the difficulty of ascertaining how much electricity has passed by the surface moisture or dirt adhering to the insulator. This conduction by the surface of a body it is very difficult to avoid, and for the following reason :—There is an exceedingly large quantity of common salt (or chloride of sodium) floating about in fine particles, in the air. The perspiration of one's hands contains a large proportion of this ingredient. Now a great deal of this salt is deposited or condensed on the surface of any solid body (as those amongst our students who have worked with a spectroscope will be painfully aware), and as salt is, in relation to an insulator, not such a very bad conductor, a large proportion of the electricity escapes over the surface. Glass, when thoroughly warm and dry, is a very perfect insulator, but in ordinary or moist atmosphere much of the electricity finds its way to earth, and is lost. The ebonite or vulcanite insulators of electrical instruments are very quickly covered with such a conducting film, and Mr. Varley, who has studied the subject extensively, recommends the washing of the surface of the ebonite or vulcanite with very dilute sulphuric acid, then with water, rubbing until dry, when the surface may have solid paraffin rubbed over it.

The presence of this conducting film at once explains how preferable it is to reduce the extent of surface of an insulator, on the ground that by reducing the superficial area we reduce the liability of the electricity to escape. The glass insulators of our telegraph posts are constructed on the principle of exposing as little conducting surface as possible.

It should be remembered that, although there is much difference between what is generally termed a bad conductor and an insulator, the latter does not mean a substance giving infinite resistance, through which no electricity can pass, but simply a *very* bad conductor. Graphite and gas-coke are bad conductors, for their specific resistance is from 1,500 to 40,000 times that of pure copper. The resistance of gutta-percha, however, bears very little relation to this, as we may gather from the resistances of a cubic metre of various kinds of gutta-percha employed in the undermentioned cables :*

	B. A. Units of Resistance.
Red Sea	$0{\cdot}362 \times 10^{12}$†
Malta Alexandria	$1{\cdot}280 \times 10^{12}$
Persian Gulf	$1{\cdot}800 \times 10^{12}$
Atlantic (2nd)	$3{\cdot}420 \times 10^{12}$
Gutta-percha, at 24° C.	$3{\cdot}530 \times 10^{12}$

For the purpose of comparison it may be stated that the British Association unit of resistance would be measured by a conductor of pure mercury, 1 sq. millim. in section and 1.0486 metres long at o° C. Of course a cubic metre of copper would have no perceptible resistance.

The most useful information we can give the student as to the nature and character of the principal insulators, is to describe what they are, and, as far as known, the method of preparation :

India-rubber.—This well-known substance, sometimes called caoutchouc, is the dried juice of a tree, the trees yielding the juice being known botanically as of the orders *Urticæ*, *Euphorbiaceæ*, *Apocyneæ*, the product of the *Siphonia cahucu* (South American) and of the *Urceola elastica* (East Indies) being known commercially. The native incises the tree, and collects the exuding juice in vessels of dried clay, whence the product takes the form known as "bottle" rubber. The juice is solidified by the application either of artificial heat or of that of the sun ; in the latter case the product is known as "lard" gum or rubber. In this way we obtain the immense supply of india-rubber for our cables, the purposes of waterproofing, &c. ; as much as 120,000 cwts. having been produced in 1870, 60,000 cwts. of which came from the island of Java.

Pure india-rubber is white, and, when in thin sheets, semi-transparent. Its elasticity is perfect. It is non-fibrous, but it possesses the curious property of becoming somewhat fibrous and less transparent when excessively stretched. It is not brittle when cold, but becomes hard ; hot water and steam render it soft, but it suffers no chemical change from their action.

India-rubber is soluble in—

Alcohol-free ether,
Oils of caoutchouc,
" turpentine (with heat),
Sulphide of carbon,
Persian naptha,
Chloroform,
Benzoline.

It is insoluble in alcohol ; it is not decomposed by dilute acids or strong alkalies (strong acids readily decompose it). If a piece of india-rubber be stretched and then immersed in cold water, it looses some of its elasticity, which it regains when placed in water at 45°. It melts at 200°, and when ignited gives off a gas possessing high illuminating power.

The chemical formula of india-rubber is $C_4 H_7$, and 100 parts of this substance contains 87·5 parts of carbon and 12·5 of hydrogen.

The electrical resistance of india-rubber decreases with increase of temperature, but not so rapidly as with gutta-percha. Under pressure the resistance increases.

Vulcanite.—India-rubber immersed in molten sulphur becomes subject to several changes,—that is to say, it is vulcanized, and remains elastic (while india-rubber hardens) at very low temperatures. The solvents of india-rubber no longer act upon it. There are several methods of preparing vulcanite, the chief being the following :—Parke's method : The india-rubber is thrown into a mixture of 40 parts sulphide of carbon and 1 part chloride of sulphur, placed in a chamber heated to 21°. The sulphide of carbon is volatilized, and the vulcanized rubber is then washed, first with a dilute solution of caustic potash, and then with water. In Humphrey's method benzoline is substituted for the sulphide of carbon. Many other methods have been devised, but they have not met with extended use.

Ebonite.—Ebonite is vulcanized india-rubber hardened by the use of more sulphur (50 to 60 per cent.) and higher temperatures than are employed for vulcanite, together with the addition of gutta-percha, asphalte, pipe-clay, sulphide of zinc, &c. Ebonite is only slightly elastic.

Hooper's India-rubber.—The Hooper Company cover the wire of their cables, first with pure india-rubber ; then, subjecting the india-rubber coating to a vulcanizing process, the outside becomes hardened, and less susceptible to the action of sea-water than is pure rubber. This compound is much less liable to variation in resistance by increase of temperature than gutta-percha, as the following observed resistances will show :

Temperature.	Resistance.	
	Gutta-percha.	Hooper's Core.
0° C.	100·0	100·0
10° C.	28·9	58·8
20° C.	8·4	29·1
30° C.	2·9	16.7

Gutta-percha.—Like india-rubber, pure gutta-percha is quite white, and it is also the dried juice of a tree, the *Isonandra gutta*. The term "gutta-percha" is really derived from the Malay language, and signifies "Sumatra gum," the island of Sumatra being known as "Pulo-percha." Gutta-percha will bear great strain (1¼ tons to the square inch), and on this account, especially in a form modified by Mr. Willoughby Smith, has been more extensively employed for telegraphic insulation than any other material. Its solvents are—

Oil of turpentine (with heat),
Sulphide of carbon,
Chloroform,
Oil of caoutchouc,
Coal-tar oils.

It is insoluble in—

Water,
Dilute acids,
Alkalies,
Alcohol.

Gutta-percha and india-rubber absorb water, to the following amount, as given by Messrs. Clark and Sabine :—

	In Fresh Water.	In Salt Water.
	23·00 per cent.	3·0 per cent.
Unvulcanized	19·00 "	3·9 "
Vulcanized	10·14 "	2·9 "
Gutta-percha	1.50 "	1·0 "

* Taken from Prof. Jenkin's "Cantor Lectures."

† 10^{12} should be raised 10 raised to the 12th power, that is, one with 12 noughts after it, or a million times a million.

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With regard to electrical resistance the effect of temperature is greater than with india-rubber, while the resistance increases to a considerable percentage under pressure.

Asphalte or Bitumen.—This substance is employed in the manufacture of cables, and is found as a natural product in various parts of the world. An artificial product termed asphalte is obtained from coal-tar, which is sometimes mixed with lime and sulphur. The natural product is also known as mineral pitch.

Clark's Compound.—This insulating material, for the outer casing of the iron sheathing of cables, is stated to be composed of five parts by weight of tar, 30 parts of silica, and 65 parts of mineral pitch.

Chatterton's Compound.—Is really a cement, used to lute together the coatings of gutta-percha upon a cable-conductor. It is composed of 3 parts by weight of gutta-percha, 1 part each of resin and Stockholm tar. The insulating power is much less than that of gutta-percha.

SOCIETY OF ENGINEERS.

At a late meeting of the Society of Engineers, Mr. J. H. Adams, Vice-President, in the chair, a paper was read on railway train intercommunication by Mr. S. A. Varley. The author, in the first place, sketched the history of the subject, and referred to the early introduction of electric systems as a means of communication between passengers and guards. The cord system, it was stated, had been in operation for about four years, but had failed, the difficulties attending its use and the cause of its failure being explained by the author, who pointed out the advantages of the electric system for signaling in railway trains. He next laid down six conditions which electric signals ought to fulfill, and then proceeded to describe in detail the systems of Mr. Preece and Mr. Walker, and his own, as used on the royal train, pointing out the merits and demerits of each system. The paper was illustrated by means of signaling apparatus, arranged on a model train of three carriages and two guards' vans, the electrical apparatus and couplings being full size, and which was worked by Mr. Varley. The subject was well discussed by the meeting, there being a number of telegraphic engineers, electricians, and others interested in the question, present. The opinion generally expressed was that, sooner or later, the electric system of signaling on railway trains would be adopted.

Researches on the Electricity Produced in Mechanical Actions.—*M. Joulin.*—Induced by observations of the electrical phenomena produced in belts for the transmission of motion, M. Joulin constructed new electric machines in order to study such phenomena, consisting each of a belt and two pulleys. For the pulleys he used cast-iron, copper, zinc, wood, leather, hardened caoutchouc, wool and silk. For the belt, leather differently prepared, having a purverulent coating of talc, resin or oxides, or a coating of wool, silk or gutta percha. The maximum velocity of the belt was 1,200 metres; the maximum tension weight 300 kilogrms. The motor pulley rested on fixed, the other on sliding, supports. M. Joulin observed the points at which a metallic sphere, with fine needle attached, brought near the system first became luminous in the dark; and these points, taken together, gave surfaces of equal potential. He states the results for conducting and for non-conducting pulleys, and indicates how the permanent electric state is established in the machine. He finds that the free electricity perceived is the dynamical charge accompanying a current which is propagated through the belt—a charge which, according to Ohm's law, decreases from one extremity to the other, of the belt, as the ordinates of a trapezium for conducting pulleys and those of two similar triangles for non-conducting pulleys.

ON COMPOSITE ELECTRIC SPARKS.

Note by M. A. Cazin.

I term *composite sparks* those sparks with several branches which we frequently perceive with the Ruhmkorff coil, especially when the poles of the coil communicate with the armatures of a condenser, or as took place in the recent experiments made by M. Guillemin, with large metallic surfaces separated from one another. I have discovered that the sparks which compose the bundle are successive, and I have seen their number attain several hundreds by the simple approximation of the electrodes. Here is the principle of my experimental method: The spark burst in the focus of a collimator on the edge of a disc revolving around its centre. This disc is opaque, and divided into equal parts by lines. From the other side of the disc, and in the passage of the luminous rays of the spark, is fixed a pierced screen, the opening of which is equal in width to a division of the revolving disc. This opening is watched with the glass of a cathetometer, and when a single spark bursts in the focus of the collimator there appears in the field of the glass only a single line of the revolving disc; but when the spark is composite the line is perceived to move in into the various positions which it occupies at the time of discharge of the simple sparks which go to compose the total discharge. I will describe one of my experiments: The electrodes consist of two platinum buttons of 7 m.m. diameter, their distance being measured by the aid of a micrometer. The disc is 22 c.m. in diameter, and bears 48 divisions. It is rotated by a Froment's electromagnetic engine, and makes 38·78 turns per minute, the length of passage of a line being 0·0322 second. The poles of the induction coil are put into communication with the buttons of the discharger, and with the extreme armatures of a cascade of three jars. The circuit is opened and closed by hand. Here is a series of observations made at the opening of the circuit:

Distance of Electrodes. m.m.	*Observed Effect.*	*Duration of total Discharge. Second.*
7·00	No spark	—
6·00	A brilliant flash	—
5·00	Do.	—
4·00	2 flashes	0·002
3·00	3 flashes	0·003
2·00	5 to 6 flashes	0·008
1·46	10 flashes	0·011
0·62	Numerous flashes	0·016
0·21	Still more numerous	0·024

An analogous experiment with another disc led me to observe 500 sparks, but in the last two experiments given above the sparks were too numerous to count. We may conclude, from these experiments, that whilst the distance of the electrodes decreases, the number of successive sparks which compose a discharge increases gradually to several hundreds. These experiments are analogous to those which M. Nyland made upon the mechanical effect of the discharge of an induction coil whilst it traverses a moving strip of paper. He counted a great number of successive holes, which appear to me to correspond to the successive sparks constituting a composite spark. There is, however, a considerable difference. M. Nyland obtained a considerable number of holes with the direct spark from the bobbin, without the Leyden jar. With me, in this case, the sparks are always simple. I purpose continuing this subject, which may furnish something interesting to the theory of electricity.

THE EAGLES METALLIC BATTERY.

This battery, a modification of the Daniell, in some respects differs from any galvanic battery before known. The elements employed are very simple, the only chemical required to be used being sulphate of copper. One peculiarity of this battery is, that the cell itself, instead of, as in most other batteries for telegraphic purposes, being of glass, is made of *lead*, and at the same time forms the negative pole of the battery.

In setting up or preparing this battery it is only necessary to put into the lead cells a quantity of sulphate of copper (five pounds of which to each cell is found in practice to be advantageous). Over the sulphate of copper a layer of sawdust about an inch thick should be placed, and the zinc set upon the sawdust, then a sufficient quantity of water to cover the whole is poured into the cell. After standing in closed circuit for a few hours the battery will develop its strength, and is ready for use. If it is desired to obtain immediate action a solution of sulphate of zinc should be used instead of water. To prevent or retard evaporation oil may be poured upon the surface of the fluid. It is claimed that cells prepared in this way will continue in action for six months or more without renewal or any attention whatever.

The electro-motive force of the cells of this battery is, of course, the same as that of the Daniell or any form of sulphate of copper element; but, unlike them, the internal resistance is very low, consequently a proportionately greater amount of electricity is evolved in a given time. The internal resistance may be varied, to suit circumstances, from below one ohm up to five ohms or more, by varying the thickness of the sawdust layer from one to five inches. From one to five inches is usually about right for a local sounder.

THE ARIZONA TELEGRAPH EXTENSION.

In relation to the Government military line about to be constructed in Arizona Territory, the *Arizona Citizen* of June 21st, says:

"Mr. R. B. Haines, District Superintendent of the Western Union Telegraph Company, ought now to be in Arizona to superintend the construction of the military telegraph from Prescott to Tucson. He arrived at Los Angeles on the 11th instant, and carried with him official instructions to report to the chief quartermaster of Arizona, which he intended to do after a day or two with his family in Los Angeles. The wire, insulators, batteries, &c., are now on the way to Yuma, by the steamer Newbern."

The Prescott, A. T., *Miner*, of the same date, says: "The latest report concerning the proposed telegraph line from Prescott to Tucson is that troops will have to cut the poles, and do all the work, under the direction of Captain George F. Price. This, we learn, is what General Dana has said."

The Shah probably never presented so gorgeous an appearance as on the night of the concert at the Albert Hall, when, suddenly and simultaneously, five electric lights were reflected upon the group of which he was the centre. Each light was the result of fifty Grove's cells, making a total of 250, placed on the balcony outside the building, whence wires were led to the carbon points inside, under the care of Messrs. Tisley and Spiller. The whole of the glare from the five lamps was concentrated upon the dais, where the effect produced can only be imagined by those who have seen diamonds illuminated by the same intense light. The Shah is said to have been highly delighted with the brilliant spectacle, and certainly the spectators were, as well as interested at seeing the Princess of Wales explaining the details to his Majesty.

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CORRESPONDENCE.

SAN FRANCISCO, CAL., June 28, 1873.

To the Editor of the Journal of the Telegraph:

I have read with interest the correspondence in JOURNAL OF THE TELEGRAPH relating to a change of alphabet; and since a pretty free discussion is allowed, with your permission I will add an idea or two of my own. I have but little sympathy, or even patience, with the petty jealousy which would exclude an alphabet, if clearly proved to be better than the one now in use on this Continent, through fear of cheap competition. That idea is unworthy of telegraphers as a body; nor do I believe that even a respectable minority would allow themselves to adopt such a course of reasoning. The majority of telegraphers surely have too much good sense not to perceive that their standing and remuneration depend on their real worth, not on any foolish attempts to throw obstacles in the way of those honestly seeking to qualify themselves for the profession. Nor can I, while liking the spirit of your correspondent, X. Y. Z. in the JOURNAL of June 2d, quite agree with him in the opinion that "operators, chief operators, managers and superintendents, are almost a unit against the change." True, a majority of those who have so far spoken through the columns of the JOURNAL OF THE TELEGRAPH, have been adverse to any change, or rather, I should say, adverse to exchanging the Morse for the Continental alphabet; but that a majority of experienced and thoughtful operators and electricians are adverse to any change of alphabet, I am by no means certain. It must be borne in mind that those who are best fitted to give an intelligent opinion, are not always the first to express their views; and they may be the more backward about volunteering their advice in the present instance, from an appreciation of the immense effect, for good or evil, which any change must necessarily produce. Any change which, in the present state of telegraph, is deliberately and advisedly made, will probably result in an alphabet which will last for generations, and if an alphabet better or worse than the one now in use, "by the twentieth part of one poor scruple," be adopted, the effect, though slight as regards any single individual, when multiplied by the great and increasing number of operators, will be seen to be such that the boldest may well pause before taking hasty steps.

The first thing to be considered is whether any change is desirable; and if this is answered in the affirmative, then it seems to me that the only consideration for Americans, is to determine upon the best alphabet, without regard to any now in use. We can well understand why it should be desirable for England, which, by a large number of wires, is in direct communication with the continent of Europe, to have the European alphabet; but her case can never have a parallel with us, and it is our concern to see that we have a uniform alphabet throughout America, best adapted to the English language.

Now it seems to be the general opinion that some change, particularly in regard to the spaced letters, is desirable. How shall this change be made? Can there be any better or more satisfactory manner, than by the directors of the most important companies in the United States appointing some of their best operators and electricians to meet in Congress, and after a full interchange of views commensurate with the importance of the subject, to determine upon an alphabet? Then let the alphabet be submitted to the great body of telegraphers, with an invitation to subject it to the severest tests in actual use on the wires, and to report what may seem to be defects. Especially let them note any combinations which may tend to produce "bulls." At the end of a reasonable time—say six months—let the telegraphic Congress again meet to revise its work. In this manner, I doubt not that we should have an alphabet which for rapidity and freedom from combinations liable to produce error, would command the confidence and approbation of all telegraphers.

We can see that while the general rule would be that the letters most often used should be represented by the shortest combinations, yet this must always give way whenever it would lead to combinations liable to errors. It might possibly be shown, also, that some of the letters most frequently used, would be read by operators with greater ease if the *very shortest* combinations were not used. Certainly, the ease with which the ear can catch any particular combination is a very important consideration. If a message can be received in sixty seconds with one alphabet, and there is any greater ease and certainty in another alphabet which requires sixty-one seconds, the latter might be preferable; speed within certain limits being subordinate to ease and security. To properly balance and give due weight to these considerations of certainty, speed and comfort, requires good judgment and scientific knowledge, guided by practical experience, and makes the combined wisdom of a Congress so manifestly superior to the judgment of any single individual, that it seems like presumption for any one operator to attempt to decide upon any single letter, much less upon an alphabet.

To accomodate railroad lines, and perhaps all lines, how would it do to select to represent figures the best combinations, regardless of their being already used for letters, and when an operator has occasion to send figures, let him prefix them with the letters "fi"? I believe this has been to some extent tried in England, and with satisfactory results.

A.

GLENDALE, June 30, 1873.

To the Editor of the Journal of the Telegraph:

Although there has been much space in your valuble columns already taken up in discussing the proposed adoption of the "Continental alphabet," I would like to say a word in favor of disposing of the spaced letters, or at least some of them. From the temper of the correspondence, so far, it is quite evident that, as a class, the operators do not take kindly to the "Continental," or will never favor its adoption unless forced to do so, although nearly all admit that the spaced letters are very objectionable, and are the cause of numerous errors. To get relief from the spaced letters, I think Mr. Geo. T. Williams' suggestion, that we abolish the character . ..., a good one (would be better if ... . was coupled with it also). I think this change would not be resisted on the part of the operators, if some short combination was substituted in their places. And when once operators got familiar with the new characters, take C, O, R and T, which latter has to be guessed at often, and change them, too, leaving the balance of Morse alphabet as it is, it being very questionable whether the Continental is any improvement upon the Morse, with the exceptions named, even if it has been arranged scientifically and systematically by German savants to suit the German language, the different letters not being used in the same proportion in making words in the English and German languages, by any means. I hope this discussion will be kept up until we are relieved from the responsibility of guessing out messages transmitted in uncertain characters.

H. E. WILLIS.

PRINCETON, N. J., July 19, 1873.

To the Editor of the Journal of the Telegraph:

I was fortunate enough to see Mr. Varley's first letter regarding the proposed change of alphabet, in an old number of the JOURNAL, and I have read the later correspondence on the subject with a great deal of interest. Having been a practical operator on nearly all the old systems on the other side, I wish to say a little about the subject. It seems to me one great fact is purposely eluded by Messrs. Varley & Culley, namely, that there were in practical operation in all the principal offices on the other side for many years, three different systems of telegraph—the dot and dash of the Morse, the right and left movement of the single needle, and the double needle. Nearly all the operators could work these three different systems, because each of them presented ideas to the mind as different as one language is to another. I have worked a railroad repeating office by myself with these three systems in use, could pass from one instrument to the other. It was very easy for Mr. Culley to issue orders for a change in the Morse code, there being other systems to fall back on while we were learning the new code. Here you have only one system in use, and I can't understand how the change is to be brought about unless on some plan similar to the following.

Suppose I can converse fluently in a foreign language, and I am desired to change the sound of some letters, and exchange the sound of others crosswise, and while I am making this great movement I am supposed to carry on my conversation in that language without cessation. I should think my brain would be in a queer state. You will find from Mr. Culley's letter that he admits all these systems were working on the other side, but I can't make out why nobody has yet noticed that the English had older and totally different codes to work while they were learning Morse, or substituting the Continental for the American code.

J. D.

BALDWYN, Miss., July 9th, 1873.

To the Editor of the Journal of the Telegraph:

If you will admit a brief opinion on the "much ado" subject of changing the Morse alphabet, I will consider myself highly honored, as this is my first to the JOURNAL.

I would say that the only change that I see necessary is to abandon our "&," which is so frequently "bulled" for "E. S.," and write it out in letters—"*and*." This is a source of almost inevitable error. With this change I think our alphabet will be unexceptionable, and there will be no excuse for error when care is exercised and the letters properly made.

T. P. S.

To the Editor of the Journal of the Telegraph:

Since the publication of the International Alphabet every successive issue of the JOURNAL has had a number of articles, *pro* and *con*, with regard thereto. I will venture the opinion that there is scarcely an attentive operator who has not already become familiar with the foreign characters. I can perceive no reason as yet advanced why the mystic language should not be universal, if the interests of telegraphy will be subserved thereby. It is true our tongue was first spoken, but we had dialects even among us which have been absorbed; and in view of the fact that we are rapidly approaching the epoch of a cosmopolitan or homogeneous condition, I think we should manifest our national progressiveness by the adoption of the few transposed foreign characters.

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To the Editor of the Journal of the Telegraph:

There is fear of precipitate action on the alphabet matter. Though I am not intimate at inner circles, don't know members of executive committee, nor any one who knows the future, yet I have the satisfaction of feeling that the W. U. will not decide without a little convention. I think they will consult some of our ablest practical operators, with a view to finding what is best to do to lesson errors. It is unprofitable for some folks that the directors, executive committee and most of the stockholders *are not active, practical* telegraphers, employés at the key, the counter or elsewhere. Since they are not, the next best thing is to consult with a goodly number of actual employés—those who have no axes to grind, and such as hold their position more on account of their skill than from any personal preferment. There are plenty of men just fitted to help the Company out of any dilemma—men who are not only able to recognize merit and detect demerit in new ideas, but are able to conceive and execute better ones, or to substitute good points where bad exist in new propositions. It would be short-sighted in proprietors to push ahead without questioning their engineers; and I cannot for a moment believe that in this matter the Company will take a single step without a full, searching examination of the whole subject by and with those who alone can shed all the true light upon it, so far as feasibility in its operation is concerned.

It is a melancholy fact that our best practical electricians, systematizers and managers are not always the men who fill those places; but this fact *need* not deprive the Company of the use of the best brains in its employ. I know that propriety might seem violated should any employés below district superintendents be consulted when the time comes to decide.

I do not consider much of the correspondence published as entitled to a feather's weight. The men of real deep thought are slow to speak, and they seldom or never publish their views. They hardly give an opinion as to expediency, even when asked. They never thrust forth their personal views unasked.

Now, having expressed what I know many feel and fully appreciate, I hopefully close.

TORTOISE.

GENESEO, N. Y., July, 1873.

To the Editor of the Journal of the Telegraph:

I have been exceedingly interested in the letters which you have been publishing from time to time in regard to a proposed change of alphabet. I do not lay claim to being an operator of great skill, nor shall I, perhaps, ever become such, yet I cannot refrain from expressing my humble opinions upon this subject, fraught with great importance to every American telegraph operator. Now, in the first place, it is undoubtedly true that we, as the greatest and most enterprising business people of the globe, should have in practical use the most perfect alphabet for the transmission of telegrams that human ingenuity can devise, and the fact that the alphabetical characters now in use by us have been used for many years should not deter us from instituting a change for the better; but in this connection there are two important matters for consideration, viz.: Since the invention of the "mighty telegraph," up to the present era of its history, what person or persons have been, or now are, the most likely to prepare for us the most perfect alphabet possible? It seems to me there can be but one answer to this inquiry—Morse. I believe the author of our alphabet conceived, by means of patient study, a correct idea of the most perfect combination of characters to represent upon the wires our English language that ever has or ever will be invented. Realizing, as he must certainly have done, the great necessity of producing an alphabet that need never be changed while the affairs of this mundane sphere should be conducted by telegraph, it is but natural to suppose that he exerted the faculties of his God-given genius towards bringing out, for the permanent use of unborn thousands of telegraph manipulators, a perfect alphabet.

The second consideration is this: If the time has really come when a universal belief prevails that the Morse alphabet is too imperfect for practical use, what shall we have in its place? Shall we accept the European method, which is, to all appearance, vastly more awkward, and equally prolific of errors, and to adopt which seems like taking a step backward instead of forward, or shall we look to the "coming man" for a new alphabet?

I am glad to believe that much as has been said and written upon this subject, a change will never be made, unless after the most careful investigation by the best minds giving their attention to telegraphy. It should be deemed the part of wisdom to effect such a change.

Those who will closely study the Morse characters will observe a similarity between each character representing a given English letter, and the shape of that letter when printed or written, and also its sound upon the instrument. To illustrate, what character, or combination of characters, could possibly better represent the letter *E*, as it appears to our eyes in the English, or sounds to our ears upon an instrument, than the one Morse has given us? And the same resemblance may be traced throughout the whole alphabet.

Our alphabet, as a whole, is possessed of more smoothness, more music, more rhythm, and more beauty than any which ever has or probably ever will be arranged, and because errors sometimes occur in its use nothing to the contrary is thereby proven.

I submit these opinions in the utmost humility, being, as I have said, but an humble proficient in, though an earnest lover of, our beautiful art.

H. F. PEET.

To the Editor of the Journal of the Telegraph:

From personal experience and a careful observance of the articles which have appeared in the JOURNAL, I find that the spaced letters are all that is objectionable in our present alphabet, and to remedy this defect we have but to substitute *new* characters for those now representing E and I, then the balance cannot be mistaken.

BALTIMORE, June 10th, 1873.

To the Editor of the Journal of the Telegraph:

Taking advantage of your expressed desire that all members of the Insurance Association should give their views on the subject of the $1,000 policy, to be paid irrespective of the number of members, I beg leave to submit the following as the opinion of quite a number of the members in this city.

They approve entirely of giving a fixed sum to each member's heirs at death of member, but from the fact of the membership now being so large and steadily increasing, we propose that the amount be made $1,200.

This amount will still leave such a surplus in the Association from each assessment, that the object of making the stated amount payable occasionally without an additional assessment being necessary to meet the loss.

Hoping some one, with abler pen, may follow with stronger argument.

BALTIMOREAN.

To the Editor of the Journal of the Telegraph:

A party steps off the train and hands to a man on platform a message, accompanied with thirty cents, requesting him to hand to operator. Message and money are duly handed me, and upon examination of Tariff I find the rate to be seventy-five cents. Now what am I to do? The party sending message has got on the train and left, and an entire stranger to me, consequently I can't *safely* send the message collect. Please answer through JOURNAL, and oblige.

MANAGER.

Answer.—You cannot send the message. The money and message should be returned to the person who handed the message in.

S. C.—A first-class operator should be able to receive at least thirty words per minute by sound, and transcribe it legibly. He should be able to transmit forty words per minute, in a clear and distinct manner. He should also understand the formation and care of batteries, running of wire connections, and possess a general knowledge of the proper conduct of the service. These qualifications, combined with judgment and good temper, are the principal requirements to constitute a good operator.

Frank Dickinson.—There are seven words in "Look for pocket book left under pillow."

Valparaiso.—If a message is handed in, to be sent collect, which is an answer to one received three or four days previously, a guarantee should be required of the sender.

Operator.—There are thirteen words in "Stop shipments to P. & E. C. Co., Waverly pockets, until further notice."

X—There are eight words in "J. L. Smith will be here at noon." How any one could, as you say, count it six, is beyond our comprehension.

Inexperience.—Exactly so.

D. D. S.—Your inquiry is not clear.

IN execution of a convention recently signed by Lieutenant-Colonel Maxse, Governor of the Island of Heligoland, on the part of the British Government and Senate of Hamburg, a telegraphic cable has been laid from the above-named island to the station at Cuxhaven, at the mouth of the Elbe, and is now open for public traffic. Some ten or twelve years ago a cable was laid from the coast of Norfolk to Heligoland by the Submarine Telegraph Company, but it was soon broken or cut through, and never repaired. It was said at the time that the inhabitants of the island, who live upon shipwrecks, were systematically opposed to the innovation of interfering with what they consider their vested rights, and that they do so may be gathered from the fact that in their church prayers are publicly offered up every Sunday to the Almighty to bless their rocky coast with shipwreck. It is a great question whether this barbarous custom is continued at the present day with the knowledge and consent of the British Government. Let us hope that it is not.

BORN.

BELL.—At Reno, Nevada, July 8, 1873, to Frank Bell, Supt. W. U. Tel. Co., a daughter.

MARRIED.

GATES—DANIELS.—July 14, 1873, at the residence of the bride's parents, by Rev. M. B. Benton, A. Wesley Gates, of Andover, Ohio, to Miss Virtue A. Daniels, of Chautauqua, N. Y.

PRIDDY—MCGEE.—July 16, 1873, at the residence of the bride's mother, Charles W. Priddy, Manager W. U. Tel. Office, Bartlett, Tenn., to Miss Bettie McGee, of Bartlett.

DIED.

FOWLER.—At Dubuque, Iowa, July 21, 1873, after a short illness, Robert S. Fowler, Supt. Telegraph.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
August 1, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Gainsville, Ala., closed.
Loachapoka, Ala., closed.
Kirkwood, Del., re-opened.
Middletown, Ill., changed to Middleport.
Tamaroa, Ill., re-opened.
Otterbien, Ind., re-opened, square 289.
Blue Rapids, Ks., closed.
Bosland, Ks., P. O. A. is Wilson, Ks.
Centralia, Ks., closed.
Effingham, Ks., closed.
Frankfort, Ks., closed.
Irving, Ks., closed.
Kingsville, Ks., re-opened.
Muscotah, Ks., closed.
Netawaka, Ks., closed.
Wetmore, Ks., closed.
Waterville, Ks., closed.

There is now a W. U. office at Riverton, Ky., square 203; check direct.

Messages for Weymouth and South Weymouth, Mass., offices closed in last JOURNAL, can be mailed or delivered by special messenger from Boston, Mass.; if by latter, $1.50 for delivery should be collected.

Mackinaw City, Mich., re-opened, square 127.

Hereafter the "Tariff for Other Lines" to Lake Crystal, La Sueur, Mankato, Ottawa and St. Peter, Minn., will be 125 and 8 from Chicago, Ill.

Booneville, Miss., closed.

Northumberland, N. H., changed to Groveton. Business for Northumberland can be mailed at Groveton, N. H., or delivered by special messenger; charges for latter, $1.25.

Tamworth, N. H., closed.

West Ossipee, N. H., is now a W. U. office, square 20; check direct.

Three Bridges, N. J., closed.

Middlefield, N. Y., closed.

Hereafter the "Tariff for Other Lines" from Syracuse, N. Y., to Parish, N. Y., will be 25 and 2.

The P. O. A. of Palestine, O., is East Palestine, Columbiana Co.

Ava., O., closed.

Haverhill, O., closed. Messages can be delivered from Riverton, Ky.; charges for delivery, 25 cents.

Trout Run, Pa., is now a W. U. office, square 93; check direct.

The office at Williamstown, Pa., will hereafter be checked direct, square 76.

Rutherford, Tenn., closed.

Jacksonville, Texas, re-opened, square 480.

Honey Grove, Texas, closed.

The "Tariff for Other Lines" for offices in Utah, given below, will be as follows:

Almy	55	4	Ogden, U.	
	100	7	Laramie City, Wy.	
Castle Rock	55	4	Ogden, U.	
	100	7	Laramie City, Wy.	
Echo	55	4	Ogden, U.	
	100	7	Laramie City, Wy.	
Uintah	30	2	Ogden, U.	
	100	7	Laramie City, Wy.	
Weber	50	3	Ogden, U.	
	100	7	Laramie City, Wy.	
Wasatch	55	4	Ogden, U.	
	100	7	Laramie City, Wy.	

Hereafter the "Tariff for Other Lines" for the following offices in Vermont, given below, will be as indicated:

Bakersfield	25	3	27	St. Johnsbury, Vt.
	30	2	38	Swanton, Vt.
East Hardwick	30	2	27	St. Johnsbury, Vt.
	35	3	38	Swanton, Vt.
Hyde Park	30	2	27	St. Johnsbury, Vt.
	35	3	38	Swanton, Vt.
Johnson	35	3	27	St. Johnsbury, Vt.
			38	Swanton, Vt.
Morrisville	30	2	27	St. Johnsbury, Vt.
	35	3	38	Swanton, Vt.
Walcott	30	2	27	St. Johnsbury, Vt.
	35	3	38	Swanton, Vt.

So. Hardwick, Vt., changed to Hardwick. "Tariff for Other Lines" 30 2 from St. Johnsbury, Vt., and 35 3 from Swanton, Vt.

Capon Springs, Va., re-opened: tariff 25 cents more than Winchester, Va.; check direct,

Bryan, Wy., is now an Other Line office. "Tariff for Other Lines" 75 5 from Ogden, U., and 100 7 from Laramie City, Wy.

The following is a revised list of Other Line offices in Wy., with "tariff for Other Lines" from Ogden, U., and Laramie City, Wy.:

Aspen	75	5	Ogden, U.
	100	7	Laramie City, Wy.
Bridger	75	5	Ogden, U.
	100	7	Laramie City, Wy.
Black Buttes	100	7	Ogden, U. / Laramie City, Wy.
Bitter Creek	100	7	Ogden, U.
	75	5	Laramie City, Wy.
Coopers Lake	125	8	Ogden, U.
	40	3	Laramie City, Wy.
Como	125	8	Ogden, U.
	55	4	Laramie City, Wy.
Creston	100	7	Ogden, U.
	75	5	Laramie City, Wy.
Church Buttes	75	5	Ogden, U.
	100	7	Laramie City, Wy.
Carter	75	7	Ogden, U.
	100	7	Laramie City, Wy.
Evanston	55	4	Ogden, U.
	100	7	Laramie City, Wy.
Fort Steele	100	7	Ogden, U.
	55	4	Laramie City, Wy.
Granger	75	5	Ogden, U.
	100	7	Laramie City, Wy.
Green River	100	7	Ogden, U. / Laramie City, Wy.
Lookout	125	8	Ogden, U.
	45	3	Laramie City, Wy.
Medicine Bow	100	7	Ogden, U.
	55	4	Laramie City, Wy.
Percy	100	7	Ogden, U.
	55	4	Laramie City, Wy.
Point of Rocks	100	7	Ogden, U. / Laramie City, Wy.
Piedmont	75	5	Ogden, U.
	100	7	Laramie City, Wy.
Rock Springs	100	7	Ogden, U. / Laramie City, Wy.
Red Desert	100	7	Ogden, U.
	75	5	Laramie City, Wy.
Rawlins	100	7	Ogden, U.
	55	4	Laramie City, Wy.
Rock Creek	125	8	Ogden, U.
	55	4	Laramie City, Wy.
St. Mary's	100	7	Ogden, U.
	55	4	Laramie City, Wy.
Separation	100	7	Ogden, U.
	75	5	Laramie City, Wy.
Salt Wells	100	7	Ogden, U. / Laramie City, Wy.
Table Rock	100	7	Ogden, U.
	75	5	Laramie City, Wy.
Wyoming	125	8	Ogden, U.
	30	2	Laramie City, Wy.
Washakie	100	7	Ogden, U.
	75	5	Laramie City, Wy.

NEW OFFICES.

293 Hillsboro, Ala.
294 Shelby Springs, Ala.
557 Forks of Clear Creek, Col.
590 Granada, Col.
558 Manitou House, Colorado Spgs., Col.
* Seaview House, West Haven, Conn. 25 2 29 New Haven.
378 Baylis, Ill.
297 Gurnee, Ill.
310 Middleport, Ill.
435 Gowrie, Iowa.
376 Rawley, Iowa.
* Grayson, Ky. 25 2 203 Riverton, Ky.
* Hunnewell Furnace, Ky. 25 2 203 " "
* Philadelphia Furnace, Ky. 25 2 203 " "
418 Fayette, Mo.
398 Madison, Mo.
378 Rensalier, Mo.
23 Groveton, N. H.
41 Riverdale, N. Y.
33 Southold, L. I., N. Y.
33 West Hampton, L. I., N. Y.
* Fort Ticonderoga, N. Y. 25 1 Whitehall, N. Y., Mont. Co.
* Franklin Falls, N. Y. 25 1 Whitehall, N. Y., Mont. Co,
* Irondale. N. Y. 25 1 Whitehall, N. Y., Mont. Co.
2 Oxford, N. S.
181 Belle Valley, O.
221 Milton, O.
76 Elizabethville, Pa.
66 Llewellyn, Pa.
59 Street Road, Pa,

* Cabot, Vt.	30	2	27	St. Johnsbury, Vt.
	35	3	38	Swanton, Vt.
* Danville	25	2	27	St. Johnsbury, Vt.
	35	3	38	Swanton, Vt.
* Greensboro	30	2	27	St. Johnsbury, Vt.
	35	3	38	Swanton, Vt.
* Walden	30	2	27	St. Johnsbury, Vt.
	35	3	38	Swanton.
* Cannelton, W. Va.	60	4	182	Huntington, W. Va.
	65	4	133	Greenbrier, White Sulphur Sp'gs, W. Va.
* Dimmock, "	65	4	182	Huntington, W. Va.
	60	4	133	Greenbrier, White Sulphur Sp'gs, W. Va.
* Fort Spring, "	65	4	182	Huntington, W. Va.
	35	2	133	Greenbrier, White Sulphur Sp'gs. W. Va.
* Milton	35	2	182	Huntington, W. Va.
	65	4	133	Greenbrier, White Sulphur Sp'gs, W. Va.
* Ahnapee, Wis.	75	5	307	Chicago, Ill.
* Augusta, Wis.	100	7	307	" "
* Baldwin, Wis.	100	7	307	" "
* Black Creek, Wis.	75	5	307	" "
* Black River, Wis.	75	5	307	" "
* Black River Falls, Wis.	100	7	307	" "
* Calvary, Wis.	60	4	307	" "
* Chippewa Falls, Wis.	125	8	307	" "
* Dexterville, Wis.	75	5	307	" "
* Eau Claire, Wis.	100	7	307	" "
* Elroy, Wis.	75	5	307	" "
* Grand Rapids, Wis.	75	5	307	" "
* Green Bay Junc., Wis.	100	7	307	" "
* Hammond, Wis.	100	7	307	" "
* Hersey, Wis.	100	7	307	" "
* Humbird, Wis	100	7	307	" "
* Holstein, Wis.	50	3	307	" "
* Manawa, Wis.	75	5	307	" "
* Menomonee, Wis	100	7	307	" "
* Menasha Junc., Wis.	60	4	307	" "
* Merrilan, Wis	100	7	307	" "
* Plover, Wis.	75	5	307	" "
* Rudds, Wis.	75	5	307	" "
* Scandinavia, Wis	75	5	307	" "
* Stillwater Junc., Wis.	100	7	307	" "
* Sturgeon Bay, Wis.	75	5	307	" "
* Two Creeks, Wis.	72	5	307	" "
* Warrens, Wis.	100	7	307	" "
* Wrights, Wis.	100	7	307	" "

ATLANTIC CABLE BUSINESS.

We are notified that the Hong Kong and Shanghai and the Shanghai and Nagasaki cables are broken. Messages for Shanghai should be posted at Hong Kong, and those for Nagasaki can be sent via Siberia.

Code and Cypher messages can again be acccpted from private persons for places in the Ottoman Empire.

The following typographical errors occur in Supplement No. 3, page 10, column headed "For 20 words or less."

"7.50" opposite "10 words or under," should be erased.
"Alexandria via. Malta," should be 7.50.
"Cairo and Suez via. Malta," 8.50.
"8.50," opposite France should be erased.

WILLIAM ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, July 22nd, 1873.

On and after August 1st, 1873, Mr. Leonard Cox will take charge of the Transfer Bureau in New York, previously assigned to Mr. I. C. Hendrickson, and transfers after that date will be addressed accordingly.

GEO. H. MUMFORD,
Vice-President.

EXECUTIVE OFFICE,
NEW YORK, July 24th, 1873.

From and after August 4th, 1873, money order offices will be established at the following named points in S. B. Gifford's district:

Brockport,	N. Y.,	Herkimer,	N. Y.,	Port Byron,	N. Y.	
Clifton Springs,	"	Homer,	"	Richfield Springs,	"	
Fayetteville,	"	Le Roy,	"	Tonawanda,	"	
Fonda,	"	Mohawk,	"	Trumansburg,	"	
Fort Plain,	"	Newark,	"	Union Springs,	"	
Gloversville,	"	Niagara Falls,	"	Waterville,	"	
Hamilton,	"	N. Y. Mills,	"	Watkins,	"	
Havana,	"	Palmyra,	"	Weedsport,	"	
		Penn Yan,	"			

G. H. MUMFORD,
Vice President.

On and after August 1, 1873, all communications for W. B. Hibbard, Supt. Third District, Central Division, should be addressed to him at Salt Lake City, Utah, instead of, as heretofore, Omaha, Neb.

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TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

The acknowledgment of receipt of any assessment is to be understood as an acknowledgement for all previous assessments:

ACKNOWLEDGMENT OF RECEIPTS FOR ASSESSMENTS UP TO AND INCLUDING JULY 25TH.

NOS. 42 AND 43.

16	19	27	81	89	51	78	83	84	100	185
186	187	206	237	238	242	246	252	258	316	398
451	453	455	457	481	490	527	566	597	604	617
618	652	667	671	684	695	697	705	712	725	789
800	801	804	813	869	899	904	908	934	1008	1026
1030	1031	1032	1033	1034	1050	1057	1071	1072	1105	1106
1107	1108	1109	1110	1112	1113	1115	1117	1119	1120	1121
1122	1123	1125	1130	1131	1153	1210	1226	1227	1240	1257
1328	1336	1368	1400	1450	1452	1485	1486	1496	1504	1510
1528	1529	1530	1531	1553	1556	1557	1559	1570	1579	1597
1598	1599	1600	1601	1603	1604	1605	1606	1607	1608	1610
1611	1612	1613	1618	1620	1639	1640	1641	1642	1643	1651
1653	1654	1655	1657	1670	1672	1677	1681	1692	1689	1690
1691	1692	1708	1712	1715	1716	1729	1731	1741	1743	1750
1751	1752	1753	1754	1755	1756	1757	1758	1759	1760	1761
1768	1769	1770	1771	1772	1773	1774	1775	1776	1786	1806
1810	1820	1821	1826	1829	1832	1833	1834	1835	1836	1855
1856	1857	1858	1859	1871	1885	1886	1888	1889	1890	1892
1895	1896	1904	1909	1917	1934	1935	1936	1937	1939	1940
1942	1945	1946	1948	1953	1954	1962	1972	1974	1975	1976
1979	1980	1981	1988	1989	1990	1991	2005	2007	2008	2010
2011	2012									

No. 44.

107	277	463	509	564	576	660	662	715	1154	1207
1267	1339	1591	1593	1594	1620	1666	1742	1813	1826	

No. 45.

53	289	704	742	858	859	905	923	932	1516	1862
2037	2044	2057								

ACKNOWLEDGMENT FOR 44, 45 AND 46.

4	5	6	16	23	28	42	46	52	59	60
64	77	86	91	113	121	129	131	133	140	145
157	175	208	211	217	228	235	245	269	271	275
276	278	279	280	281	282	283	285	286	301	302
312	341	342	344	346	349	351	352	371	380	381
388	392	393	394	402	405	413	426	459	464	467
478	509	510	520	532	533	536	542	547	549	553
564	600	605	615	623	636	678	679	680	698	703
711	721	722	731	734	740	742	758	764	769	775
791	797	799	815	821	830	832	856	874	875	876
880	886	912	916	917	923	941	978	1001	1009	1046
1054	1084	1087	1088	1090	1093	1196	1143	1151	1154	1169
1173	1174	1175	1178	1183	1195	1196	1198	1199	1201	1232
1245	1248	1252	1254	1260	1266	1271	1276	1295	1298	1300
1303	1306	1329	1336	1343	1356	1357	1359	1368	1385	1387
1389	1390	1391	1393	1394	1398	1402	1403	1404	1409	1410
1429	1444	1448	1482	1489	1490	1518	1527	1535	1550	1554
1560	1564	1566	1568	1569	1571	1579	1587	1589	1590	1630
1634	1635	1650	1658	1678	1695	1708	1735	1742	1803	1806
1809	1822	1862	1881	1894	1907	1919	1922	1929	1931	1933
1935	1938	1943	1944	1950	1951	1959	1960	1964	1970	1971
1983	1985	1986	1998	1999	2000	2001	2016	2017	2019	2030
2031	2027	2029	2030	2032	2035	2040	2042	2049	2052	2065
2070	2071									

We occasionally receive letters containing money that have no signature or certificate number to indicate from whom they come. The post-mark in such cases is our only clue. Last week we received three dollars enclosed in an envelope with the words "Kansas Pacific Railway" printed on the outside. There was no post-mark, name, or number. Who sent it?

The British Parliament has voted down a resolution of censure upon Mr. Scudamore for misappropriating public funds.

FOREIGN TELEGRAPHIC ITEMS

THE TELEGRAPH IN JAPAN.

The work of telegraphic construction in Japan did not fairly commence till the beginning of 1872. Since then two lines, extending from Tokei (Yedo) to Nagasaki, have been run, a distance of a little over 800 miles. There are twenty stations upon the first wire constructed, embracing the most important places in Japan. Three transmissions or repetitions are required. The second wire, which was completed last spring, is used only for treaty ports, and will be used principally for international work.

In the metropolis (Tokei) twelve local stations have been opened, the wires being principally supported upon iron poles, on account of the many severe fires in the city. The instruments used consist of Siemen's ink writer and the Breguet dial instruments, the Japanese characters being telegraphed by means of a style of writing that comprehends the whole of the Chinese characters—letters—and containing forty-seven signs, called the Katakana. The Morse system has been modified to represent the forty-seven characters.

The Imperial mint at Osaka is connected with the principal or head office in that city.

THE ATLANTIC CABLES AMALGAMATION.

The amalgamation of the Anglo-American, the French Atlantic and the Newfoundland Telegraph Companies is now completed, all the agreements having been duly executed. Of the late directors of the French Atlantic Campany, Viscount Monck, Lord William Hay, Baron Reuter, Baron Emil d'Erlanger, the Marquis de Beaumont, Mr. C. Crapelet and Mr. Edward J. Halsey have been elected upon the Board of the Anglo Company, with Mr. Cyrus Field and Sir James Anderson, late directors of the Newfoundland Company. The transfer books of the Anglo-American Company were to be closed on the 1st of July, for the purpose of allotting the bonus stock, which will carry dividend from the 1st May; the books of the Newfoundland Company are closed, and will not be re-opened, and the liquidation of the French Company will proceed rapidly. The result of the distribution of the increased stock will be that the Anglo Company's shareholders will receive about £152 for each £100, and the French shareholders about £180 for each £100, plus the cash distribution, equal at least to 8s. a share, which, together with the quarterly interim dividend of the 1st of May last, will represent a payment for the first four months of the year at the rate of 12 per cent. per annum. The Newfoundland Company will receive at once, and in any case, £100 for each £100—any further distribution, exclusive of the proceeds of their land rights, to the late shareholders in that company, which has now ceased to exist, depending upon the solution of the difficulties that have arisen with respect to their rights in Newfoundland.

It is understood that the final arrangements for the Globe scheme, for the further amalgamation of all the cable companies, will be completed in a few days.

The liquidators of the French Atlantic Telegraph Company have given notice that the transfer books have been closed, and will not be re-opened. They have further notified that the debentures of the company, viz., £400,000, issued at 95, will be paid off at par on the 1st of October, the funds for which will be raised by the alotment of a sufficient amount of amalgamated stock *pro rata* to the French cable shareholders, at 12 per cent. discount.

THE BRAZILIAN TELEGRAPHS.

The second link in the great telegraphic chain now in course of construction, to connect South America with Europe, has left the Thames. The steamship "Mazeppa," having the sections of submarine telegraph cable on board, started from North Woolwich on Wednesday morning, direct for the River Plate, where she will be engaged in submerging the cable between Montevideo, Maldonado and the Brazilian frontier. At Montevideo the cables about to be laid will be in connection with that already existing between Montevideo and Buenos Ayres and the Transandine lines into Valparaiso and Chili. The "Mazeppa" takes out the "cable house" for erection at the Brazilian frontier, in which the junction with the cables north into Rio de Janeiro will be effected. This cable house is a large iron structure, with internal accommodation for the engineering staff and an instrument room, the isolated and exposed position on the frontier, where it will be erected, rendering such a precaution for shelter absolutely necessary. The Montevidean and Brazilian Company, under the powers of whose exclusive concession the cables will be laid, expect the circuit to be completed to the Brazilian frontier about the end of August. The cables north to Rio de Janeiro may expected to be completed by the Autumn of this year. On Friday week the steamer "Hooper" anchored in Plymouth Sound, for the purpose of coaling before proceeding to Brazil to lay a cable between Pernambuco and Para. On Saturday the staff of the expedition, and a select circle of friends, were entertained at luncheon by Mr. Hooper, on board the steamer in Plymouth Sound. The "Hooper" sailed for Pernambuco direct on Sunday, and if all goes well will be home again in about three months. While at Plymouth she was visited by Admiral the Hon. Sir Henry Kepple, G. C. B., Port Admiral and Commander-in-Chief at Devonport, Rear Admiral Sir William King Hall, K. C. B., Admiral Superintendent of the dockyard, and others.

We learn from Valparaiso that permission has been granted to Mr. Leigh to lay a cable from a port in Atacama to another port in connection with Europe.—*The Railway News.*

NEW EXPERIMENTS IN OCEAN CABLES, ETC.

The London correspondent of the New York *Financial Chronicle*, under date of June 28th, writes:

"The experiment of light cables to the United States will soon be practically tested, arrangements to enable Mr. Highton to lay a cable across the Atlantic being in active progress. It is stated that if the experiment proves to be successful a great reduction in the charge for messages must necessarily follow.

THE directors of the Brazilian Submarine Telegraph Company made a call of £2 per share, payable on the 1st ultimo.

BY a law of the 22d of March the executive power of the United States of Colombia is authorized to grant $8,000 to keep the telegraph line in repair between Buenaventura and Bogota, especially in that part of the route from Ibague to Cartage.

A TELEGRAPH line is to be constructed between Palmyra and Popayan, United States of Colombia, on account of the Government.

THERE are 4,000 miles of telegraph now in operation in Buenos Ayres.

THE steamship "Hooper," with the submarine cable to be laid between Pernambuco and Para, arrived at Madeira on the 30th of June.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, AUGUST 1, 1873.

RESPONSIBILITY OF MANAGERS.

Managers of offices should bear in mind that they re responsible for all property of the Company placed in their charge, and that the same care should be exercised in the performance of their duties as would be expected of a prudent business man in conducting his private affairs. The official blanks, counter and otherwise, are property, equally with a switch or magnet; they should not be wasted, nor allowed to be purloined. Complaint has reached us that students and others belonging to so-called telegraph institutes, are in the habit of abstracting blanks from the counters of some of the up-town offices in this city, and our advice is solicited as to the propriety of the transaction. The complaint intimates that, if these parties had the *decency* to ask for the blanks, they would not be refused.

This is all wrong. Blanks should be furnished only upon reasonable presumption that they are to be used for the purpose for which they are intended. Otherwise they should be denied. When they are stolen, proper measures should be taken to prevent a recurrence of the theft. Protect the property.

GOVERNMENT RATES.

Upon another page will be found an important correspondence between President Orton and the Postmaster-General upon the subject of the rates to be paid for telegraphic messages transmitted for the Government. Without attempting to reply to the reasons advanced why the Government should pay for telegraphic service the rates charged private citizens, the Postmaster-General re-issues the schedule of last year.

The Attorney-General combats some of the views expressed by Mr. Orton, but accepts his conclusion, viz.: that a message to be sent at the Government rate is one the tolls on which are payable out of the Treasury of the United States, or out of money payable to the Treasury.

THE SIDNEY (CAPE BRETON) CABLES.

The fourth and last cable between Sidney, Cape Breton and Placentia, Newfoundland, has been successfully laid by the steamer "Edinburgh" of the cable fleet.

FRENCH TELEGRAPHY AT THE VIENNA EXPOSITION.

A Vienna correspondent of one of the New York dailies, in describing the wonders on exhibition at the Exposition now in progress at that city, is moved to comment upon the telegraphic apparatus on view in a tone extremely deprecatory of the apparent lack of enterprise shown by Americans, and in laudation of certain apparatus in the French department. Only for one fact it would hardly be worth while to refute the erroneous conclusions of the writer, but as persons not well informed upon telegraphic subjects are liable to be misled by positive assertions, however wrong, it becomes important that the exact truth should be made manifest. This is the more necessary owing to the avidity with which prominent Government officials, thirsting for more power, seize upon such statements, probably to reproduce them as matters of fact at a favorable opportunity, in furtherance of their projects. The writer says:

"I am sorry we are not represented in telegraphic apparatus, as we have several things in America that would be worth seeing. The French telegraphic department is the best in the Exhibition, and some of the inventions are exceedingly interesting. There is a machine that prints an autographic dispatch, not chemically, like the other autographic instruments, but on white paper, with printers' ink. It cannot be described in writing, and so I will not attempt to say how it is made, except that there is synchronous action of two rollers; one may be in New York and the other in San Francisco, or in any two other places connected by a telegraph wire. A written message, a draft, a sheet of music, the portrait of a burglar, anything that can be drawn with a pen—not with a pencil—may be telegraphed from one end of the world to the other, and reproduced with printers' ink, on white paper, like that whereon the patron of *The Mail* reads this letter. Then they have a machine by which four operators can work over a single wire at once in one direction, just as one operator does with us, and by putting on four operators the other way you can make the capacity of one wire equal to that of eight by the old system. We are now using in America a system by which a wire may be operated both ways simultaneously. The French machine is exactly four times ahead of us."

The interesting character of the apparatus mentioned cannot be questioned, but their value, when compared with the improved systems of telegraph used in America, and, indeed, in every other section of the globe, may certainly be disputed with success. Nothing described in the letter is of any value. As toys, they are very pretty, but for practical uses they have been tried and discarded years ago. The machine that "prints an autographic dispatch, not chemically like the other autographic instruments, but upon white paper, with printers' ink," is that of Lenoir of Paris. In effect this is substantially the same as Bakewell's, which was brought out in 1850, the only change being that an electro-magnet with a printing pad attached to the armature is used instead of allowing the current to produce the marks upon chemically-prepared paper, a substitution which has not in any manner improved the system. Lenoir's apparatus has been thoroughly tested upon the French lines and abandoned as being of no practical value.

The machine "by which four operators can work over a single wire at once in one direction," and which is "four times ahead of us" is that of M. Meyer, which we describe in this issue of the JOURNAL. The assumption would bear greater weight were it true, but as neither four, nor any other number of operators work over a single wire at once by this system, it is evident that the correspondent errs in his statement. The best results attainable with this instrument, in the inventor's own language, has been 110 messages per hour, with four operators sending and four receiving—showing an average of 27½ messages for each operator transmitting. The average of each operator working the Duplex and the best Morse circuits in America is over 40 messages per hour, and upon one occasion as many as 146 messages were transmitted in one hour by two operators with the Duplex system, while upon the printing instruments an average of over 65 by one operator has been maintained for ten consecutive hours. So much for the superiority of the French apparatus.

It is probable that the lack of interest evinced by American electricians and inventors in the Vienna Exposition arises from distrust of the peculiar laws pertaining to patents which govern the Austrian Empire. There are scores of machines of American invention far superior to any of which we have seen a description as on view in Vienna. Essaying for prizes, and winning them too, is a characteristic of the race, and to the advantages of advertising they are not usually blind.

GYMNASTIC PERFORMANCES BY A MOUSE.

No little amusement was caused in William street, near Chambers, yesterday morning, by the performances of a mouse which came from Ann street on one of the telegraph wires, walked to about the middle of the block, where he paused and treated his constantly increasing audience to a series of performances on the slack wire, of which Blondin himself need not have been ashamed. The crowd soon became so great as to block the street, when the exhibition was brought to a close by a boot-black, who brought down the performer with a brickbat.—*N. Y. Star.*

IT now occurs so frequently that telegraphic communication is interrupted in Germany from the posts in exposed situations being blown down, and the porcelain insulators broken in the fall, even by a very moderate gale of wind, that the Director-General of the Telegraph Department has given orders to make arrangements for altering the system now in use, and letting the wires run underground. The experiment will be made, in the first instance, on the line between Berlin and Magdeburg, and, if it is found to succeed, it will be generally introduced.

The *San Diego* (Cal.) *Union* states that the Western Union Company is now engaged in the construction of a new line, following the railroad and the survey to Bakersfield, where it will terminate for a time. Between Bakersfield and Los Angeles the old line will be thoroughly repaired.

MR. J. A. HINCHMAN, for a number of years attached to the office of the Superintendent of the Metropolitan District, has resigned, to take the position of Secretary to the Assistant-Postmaster of New York City.

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CORRESPONDENCE BETWEEN PRESIDENT ORTON AND THE POSTMASTER-GENERAL REGARDING RATES FOR GOVERNMENT MESSAGES.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, June 20, 1873.

Hon. JOHN A. J. CRESWELL, *Postmaster-General*, WASHINGTON, D. C.

SIR,—I have had the honor to receive your communication of the 13th instant, inviting suggestions in reference to the re-adjustment of rates at which "Telegraphic communications between the several Departments of the Government and their officers and agents" shall be transmitted, and in reply thereto, beg to say:

On the first of July, this Company will put in operation on its lines, east of the Rocky Mountains, a revised tariff, based on air-line distances, as follows:

Under 25 miles						25	cents.
Between	25	and	50	miles		30	"
"	50	"	100	"		40	"
"	100	"	200	"		50	"
"	200	"	400	"		75	"
"	400	"	600	"		$1.00	
"	600	"	800	"		1.25	
"	800	"	1000	"		1.50	
"	1000	"	1200	"		2.00	
For all distances beyond 1200 miles						2.50	

These changes effect a large reduction in the local rates throughout the Middle and Southern States. The reduction in the New England States is less, because the present rates are lower for like distances than those in other sections. It is the opinion of those of most experience in the Telegraph business in this country that a large majority of 25 cent messages are handled at a loss. Of the cost of carrying on the business—that is, the current expenses, after lines are constructed and offices equipped—60 per cent. is paid for wages, of which the wages of operators are the larger part. The cost of receiving, booking, sending to the operating room, transmitting, checking, and delivering a 25 cent. message is the same as in the case of those on which a greater charge is made. And yet it has been deemed politic to establish a 25 cent. rate, confining it, however, to stations within 25 miles. These rates are as low as private companies can afford to accept in the United States at the present time. At the higher rates which have heretofore prevailed, no company, except the Western Union, has made any profit whatever for several years past; and the Western Union, after applying its revenues to the construction of new lines, and the erection of additional wires necessary to meet the constantly increasing demands of the business, could not have made reasonable dividends, whether its property were estimated at its actual cost or at its real value. If the assumption is correct that the new rates are as low as private parties can afford to accept, it follows that when the Government, in the exercise of its authority conferred by law and the agreement of the telegraph companies, fixes a lower rate on Government messages, it imposes a hardship upon the companies.

One of the conditions of telegraphic service for the Government is that it shall have "priority over all other business." Private parties may be waiting to pay, or may have actually paid, higher rates for the use of the lines, yet it is made the duty of the companies to put aside the messages of private customers, and to send Government messages ahead of all others, and then it has been required that for the service so rendered, a sum should be accepted which was not compensation in many cases, because it did not pay the cost of rendering the service.

I submit, therefore, that the rates at which telegraphic communications between the several departments of the Government and its officers and agents shall be transmitted during the year commencing July 1, 1873, should be substantially the rates hereinbefore named, and which will take effect on that day. The present rate between Washington and New York is 40 cents; under the scale now in operation it would be 75 cents; under the new scale it would be 50 cents. But, it is not intended to advance the present rate, even if the competition out of which it arose should be discontinued. The Government rate between Washington and New York is 25 cents. I have already expressed the opinion that it does not pay the cost of doing the business. I suggest, then, that even if you shall decide to continue the present 250 mile scale, that the rate for the first 250 miles be increased from 25 to 40 cents. As an offset to this increase I should be willing that no charge should be made beyond 10 circuits of 250 miles each. That is to say: a Government message of 25 words shall not be charged more than $2.50 for transmission over the lines of any one telegraph company within the United States.

I make no suggestion concerning the rates for Signal Service Messages and Reports, being of the opinion that the rates which the Postmaster-General is authorized to fix, must be uniform in their application to Government messages without regard to the matters to which such messages relate, or to the Bureau or Department of the Government for which they are transmitted.

In this connection permit me to call your attention to the following case which recently came before me:

A District Attorney of the United States applied for an order directing that his messages relating to his official business be received and payment accepted at Government rates. I expressed the opinion that the rates which the Postmaster-General is authorized to fix are applicable only to communications exchanged "between the several Departments of the Government and their officers and agents," and not upon communications between such agents directly. But as such a construction, if accepted, would be difficult to enforce, I suggested that the test applicable to all cases where claim is made that messages should be sent at Government rates should be this: if the tolls are to become a charge against the United States, payable out of the Treasury, then the message should be sent at Government rates; but if, as in the case of a U. S. Marshal or Attorney, the disbursements for telegraphing are payable out of official fees or commissions, or from the proceeds of penalties or forfeitures, then the Government rates should not apply. I should be glad to receive a statement of your views on this point.

Very respectfully,
Your obedient servant,
(Signed) WILLIAM ORTON,
President.

DEPARTMENT OF JUSTICE,
July 10th, 1873.

SIR: I have the honor to acknowledge the receipt of your letter of the 26th ultimo, asking for my opinion upon case presented as follows:

The Honorable William Orton, President of the Western Union Telegraph Company, in a letter addressed to you, under date of 20th June instant, expressed the opinion that the Government rates should not apply to telegraphic communications on official business transmitted directly between officers or agents of the Government; and you quote from his letter as follows:—"A district attorney of the United States applied for an order directing that his messages relating to his official business be received and payment accepted at Goverment rates. I expressed the opinion that the rates which the Postmaster-General is authorized to fix, are applicable only to communication exchanged between the several Departments of the Government and their officers and agents, and not upon communications between such agents directly. But as such a construction, if accepted, would be difficult to enforce, I suggested that the test applicable to all cases where claim is made that messages should be sent at Government rates should be this: If the tolls are to become a charge against the United States, payable out of the Treasury, then the message should be sent at Government rates; but if, as in the case of a U. S. Marshal or Attorney, the disbursements for telegraphing are payable out of official fees or commissions, or from the proceeds of penalties or forfeitures, then the Government rates should not apply."

I do not agree to the applicability of the test proposed by Mr. Orton, or to his conclusions upon the point presented. Certain rights and privileges as to the public lands and otherwise are granted by the Act of July 24, 1866, entitled, "An Act to aid in the construction of telegraph lines, and to secure to the Government the use of the same for postal, military, and other purposes" (14 U. S. Stat., 221,) to such telegraph companies as shall file with the Postmaster-General a written acceptance of the obligations and restrictions thereby imposed. Section 2 of said Act is as follows: "That telegraphic communications between the several departments of the Government of the United States and their officers and agents shall, in their transmission over the lines of any of said companies, have priority over all other business, and shall be sent at rates to be annually fixed by the Postmaster-General."

Manifestly the object of this section, as indicated by the title of the Act, was to require such companies as availed themselves of its benefits, to transact the business of the Government at rates to be annually fixed by the Postmaster-General. I think that the word "between" in said section should be taken distributively as applying to communications between, first, one department and another; second, a department and its officers and agents; third, a department and the officers and agents of another department; fourth, the officers and agents of the same department; and fifth, the officers and agents of one, and those of another department. This construction is, in my judgment, in conformity with the reason of the statute.

Mr. Orton seems to think that district attorneys and marshals are entitled to the fees which they receive, but they are required by the third section of the Act of February 26, 1853, (10 U. S. Stat., 161,) to account for every dollar thereof and pay over the same into the Treasury of the United States, retaining therefrom a compensation fixed by law for their services. To compel them, therefore, to pay higher than other officers for official telegraphing, would be, to that extent, in many cases as much of a loss to the Treasury as though the money had been directly appropriated therefrom for that purpose.

Mr. Orton's test is wholly inadmissible on account of its want of uniformity. Why should an officer whose maximum compensation is three thousand dollars, to be made out of fees, pay for Government telegraphing higher rates than any other officer for similar telegraphing, whose salary of three thousand dollars is paid directly out of the Treasury?

Mr. Orton gives an unreasonably narrow construction to the second section of said Act. Why should a telegraphic message from the Attorney-

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General to a district attorney be sent for twenty-five cents, when the district attorney, for telegraphing the same number of words the same distance to the marshal of his district, and upon the same business, is compelled to pay one dollar? Both messages may be of equal importance and both upon Government business. Can any good reason be given why a collector of Internal Revenue, in telegraphing to a district attorney upon the business of his office, should pay a higher rate than the Commissioner of Internal Revenue is required to pay for a like telegram to the collector? Departments, as far as their administrative acts are concerned, are nothing but officers and agents of the Government.

Clearly to my mind, the intent of Congress was that telegraph companies operating under the Act of July 24, 1866, should transact the business of the Government at rates fixed by the Postmaster-General, and it is of minor importance as to who sends or receives the telegrams. My opinion, therefore, is that the Departments, their officers and agents, may interchangeably telegraph each other as hereinbefore stated, upon official business, subject only to the limitation that the telegraphing must be in cases where the rates are payable out of public moneys, or are to be accounted for to the Government by the officer making the expenditures.

Very respectfully,

(Signed) GEO. H. WILLIAMS,
Attorney-General.

Hon. JNO. A. J. CRESSWELL,
Postmaster-General.

RATES OF PAY FOR COMMUNICATIONS BY TELEGRAPH, 1873-'74.

POST-OFFICE DEPARTMENT,
June 28, 1873.

WHEREAS, by the Act of Congress approved July twenty-fourth, A. D. eighteen hundred and sixty-six, entitled "An Act to aid in the construction of telegraph lines, and to secure to the Government the use of the same for postal, military and other purposes," in section second it is enacted—"That telegraphic communications between the several Departments of the Government of the United States and their officers and agents shall, in their transmission over the lines of said companies, have priority over all other business, and shall be sent at rates to be annually fixed by the Postmaster-General;"

Now, therefore, in pursuance and by virtue of the authority on me by said Act conferred, I, J. A. J. Creswell, Postmaster-General of the United States, do hereby fix the rates at which the telegraph communications aforesaid shall be sent, for the year commencing on the first day of July, A. D. eighteen hundred and seventy-three, as follows, namely:

The rate for all telegraphic communications known as the signal-service messages and reports shall be three cents for each word of said reports and messages for each circuit over which it may pass in accordance with the schedule of circuits and plans of the Chief Signal Officer of the Army, which are now adopted, or may hereafter be adopted by him for transmitting these dispatches, or such part thereof as he may designate, in such words or ciphers as may, from time to time, be directed by him. The amount thus estimated is to be taken in full payment for said dispatches; no additional allowance to be made for drops, office messages, or other services or special facilities required by the Chief Signal Officer for the correct and prompt transmission of said signal-service messages and reports.

The rate for all telegraphic communications, sent otherwise than over circuits established as aforesaid, shall be as follows, viz: One cent per word for each circuit through which it shall be transmitted, said rate to be computed subject to the following conditions, viz:

A distance of two hundred and fifty miles, as computed by the tables of the Post-Office Department, shall be deemed a circuit.

If, in computing circuits, there shall be found one or more circuits and a fraction of a circuit, such fraction shall be deemed a circuit.

If a communication shall be sent a distance less than two hundred and fifty miles, that distance shall be deemed a circuit.

All words of the communication transmitted are to be counted, excepting the date and place at which such communication is filed; all messages of less than twenty-five words, address and signature included, shall be rated as if containing twenty-five words, and all messages exceeding twenty-five words shall be rated by the exact number of words they contain, address and signature included.

JNO. A. J. CRESWELL,
Postmaster-General.

THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY.

May, 1873.

APPOINTMENTS.

E. Miller.....145 Broadway.
P. N. McCauly..... " "
Miss Tillie M. Sutton ... . " "
H. Smith, "Relief"..... " "
R. Wise..... " "
J. D. Walker..... " "
Miss Elizabeth Kitchen.....Astor Place.
E. J. Dougherty.....21 Wall St.
H. A. Gray.....Pier 40, N. R.
T. Gregg. .....Canal St.
M. T. Hill.....30th St.
G. A. Mudgett..... ..... 22 Broad St.
Wm. Sweet.....Fulton Market.
G. Van Tassell.....G. C. Depot.
G. B. Allison..... ...Cedar Rapids, Ia.
W. J. Perrin.... ....Davenport, Ia.
Jos. Pachtel.....Des Moines, Ia.
E. Shoals.....Dubuque, Ia.
W. W. Cummings.....Rock Island, Ill.
C. S. Smith .... Springfield, Ill.
E. S. Swift.. .....Chicago, Ill.
C. E. Wilkinson..... " "
F. M. Schnell..... " "
P. A. Root ..... " "
A. Carroll.... ..... " "
Alvin Hicks.....St. Louis, Mo.
T. H. Foster ..... " "
W. A. Y. Redfield..... ..... " "
G. H. Parmelee..... . " "
A. G. Campbell..... " "
Jno. E. Clark.....Junction, Ks.
S. A. Johnson.....Kansas City.
F. Blair .....Crestline, O.
E. D. Hughes..... .....Millerstown, Pa.
W. Gilds.....Trump, Pa.
W. C. Connolly.....Pittsburgh, Pa.
J. W. Archibald.....Buffalo, N. Y.
Miss A. E. Barnes.. .....Cleveland, O.
Geo. Singleton.....Detroit, Mich.
Miss L. R. Neely..... ... " "
O. K. Newton.....Cincinnati, O.
H. M. Gowen..... " "
W. R. Paddock..... " "
Wm. Bernard..... " "
T. M. Shefers..... " "
O. C. Blaney..... " "
H. T. Enoch ....Springfield, O.
J. L. Teague.....Vincennes, Ind.
J. E. Stockmeyer..... " "
A. F. Knight..... " "
J. Rainoke.....Bryan, Wyoming.
W. J. Bartley .....Black Hawk, Col.
Wm. Sheplow.....Beaver Creek, Col.
C. C. Robinson.....Denver, "
Saml. Tillippi.....Trinidad, "
G. M. Pugh ....Hooper, Neb.
W. D. Linton .....Omaha, "
T. O. Herring.....Binghampton, N. Y.
J. W. Burdick.. .....Newburgh, N. Y.
Jno. Doggett.....Jordan, N. Y.
J. P. Lane..... .....Lockport, N. Y.
R. A. Gager.....Niagara Falls.
W. J. Coy..... ... " "
A. Brewer ....Rochester, N. Y.
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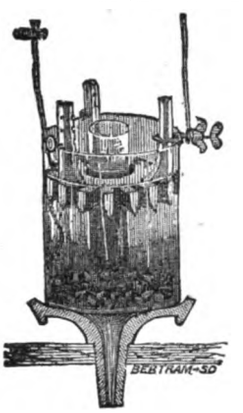
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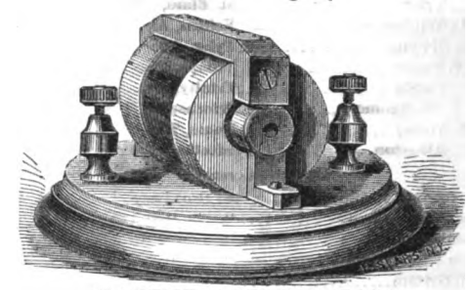
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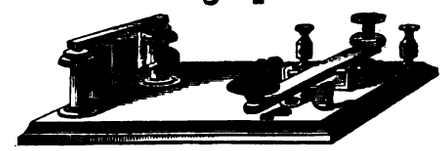
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 18. NEW YORK, AUGUST 15, 1873. WHOLE NO. 139.

SIEMEN'S POLARIZED RELAY.

This instrument is in general use in England, and in many countries on the continent of Europe, and is regarded as an improvment on the ordinary Morse relay, particularly as it does not require any adjustable spring as a retractile force.

Figure 1 represents an upper view of this instrument, and Figure 2 the same in diameter through the center.

The relay consists of a steel magnet, *N S*, bent in a right angle, Figure 3, on whose leg *N* the soft iron cores *n n'* and the wire coils or belices *m m'* of an electro magnet are fixed, whilst at the extreme end of the other leg *S* is a small iron bar *c c'*, which operates as a relay lever and armature,—turning horizontally on its pivot *B*. The motion of this armature is limited by the metallic screw *D*, on the one side, and by the agate cap, *D'*, on the other.

Figure 3 represents the steel magnet *N S* more in detail.

On the leg of this magnet the iron coils *n n'* are attached, upon which the coils *m m'* are wound. The south pole *S* polarizes the tongue *c c'*.

Figure 4 represents the electro-magnet *m m'*, the steel magnet *N S S*, and the polarized tongue *c c'*, in perspective.

As soft iron, when placed on the pole of a magnet, becomes itself magnetised, and takes the same polarity with that with which it is connected, it follows that when *N* and *S*, Figure 2, represent the North and South poles of the steel magnet, then the upper ends, *n n'*, of the iron coil standing on the North pole, *N*, likewise form permanent North poles, and for the same reason the extreme end, *c'*, of the armature, *c c'*, which at *S* stands on a South pole, permanently a South pole. Therefore, the armature will be attracted equally by north poles *n* and *n'*, but if it be brought nearer to one than the other it will be held there because it is under the influence of a more powerful force. If the attraction between *n* and *C'* is predominate the armature lever will lay over on the point *D*, and if the attraction is greater between *n'* and *C'* it will incline on the agate point *D'*. It is evident that the latter position, where the local battery, which is put in between *A* and *B*, is open, corresponds with the position of rest of the ordinary relay.

When the key is closed at the remote station, and a line current is sent through the coils, *m m'*, one of the poles, *n n'*, becomes oppositely polarized.

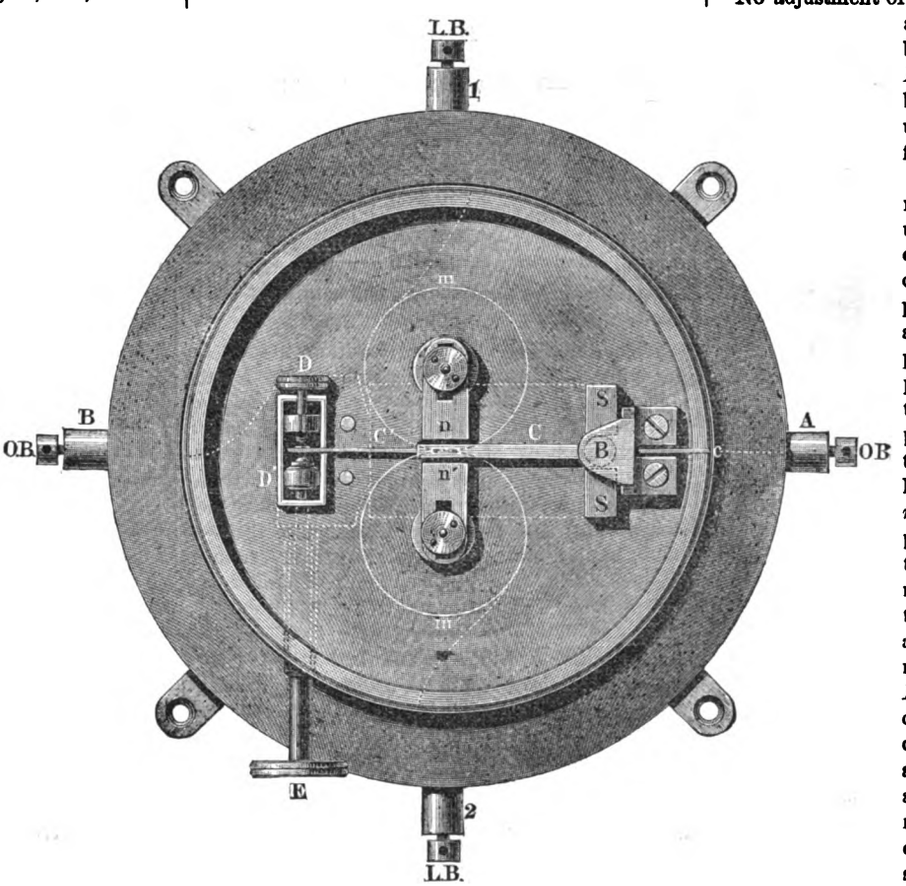


Figure 1.

Suppose that this current causes at *n* a north pole, and at *n'* a south pole, then the north magnetism already at *n* is increased, but destroyed at *n'*.

As the South magnetism at *c*, is however unchanged, the attraction of *n* toward *c'* is predominant, and the tongue of the lever *c c'* strikes against the contact screw, *D*, and closes the local circuit.

When the line current ceases the lever still remains in connection with screw, *D*, as then the electro-magnetism from *m m'* of course disappears, but the attraction between *C* and *n* is predominant on account of its being nearer.

The removal of the armature, *C C'*, to its former position can only be effected by a reverse current, which is produced at the remote station by a pole-changing key, the south magnetism being produced at *m*, and north magnetism at *m'*, by which the north magnetism already to be found at *n* is decreased and strengthened at *n'*, consequently the former attraction between *n* and *C'* is destroyed, and on the contrary the attraction between *n'* and *C'* predominates. The tongue *C C'* thus again strikes against the isolating point *D'* and interrupts the local circuit, whose poles are connected with *A* and *B*, and by it further with *C C'* and *D*.

No adjustment of the armature lever is required, after it has been properly placed by means of the regulating screw *E*, no matter which pole of the battery be to line, and thus the use of a spring as a retractile force is entirely dispensed with.

It is obvious that the polarized relay can be very advantageously used likewise for ordinary battery currents. For this purpose it is only required that the movable pole shoes *n n'* shall be placed at different distances from the polarized tongues *C C'*. The piece *n'*, which corresponds to the rest or *D'* side, must be placed nearer to the tongue *C C'* than piece *n*. In this case as long as no current passes through *m m'* the attraction of the north pole *n'*, by the south polarized tongue *C'*, increases that of the north pole *n*, and consequently the armature *C'* is constantly attracted by *n'*, and the tongue *C'* remains against the isolated point *D'* and interrupts the local circuit. When, however, a line current arrives of such a polarity as to form at *m* a north pole, and at *m'* a south pole, then the north magnetism already present at *n* is increased, and the south magnetism present at *n'* destroyed or replaced by south magnetism, so that the attraction of *n* and *C'* predominates, and accordingly the tongue *C C'* is drawn over to the opposite side and closes the local battery at *D*. It is true that with the breaking of the line current the magnetism at *m* and *m'* again ceases, but the north magnetism at *n* and *n'* caused by the steel magnet *M S* remains, and consequently the tongue at *n* should remain in the same position; but as the space for motion between *D* and *D'* is very small, only a little change is made in the distance of the tongue from *n* and *n'* on account of its movement towards *n*, and it has thus, just as before, on account of its position, a little more attraction for *n'* than

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for n. As, therefore, C' stands nearer to n' than to n, the attraction of n' predominates and attracts the tongue C' back again, thus again interrupting the local battery until a new line current closes it.

The polarized relay is exceedingly sensitive on account of the absence of the retracting spring, which the electro magnet has not got to overcome, and also because the action of the poles n and n' on the armature C C' is a double one, attracting and repelling at the same time. As no regulating of the adjustment is required to meet the varying strengths of the line current, this relay is greatly preferred to the ordinary form, and it is very generally employed all over Europe.

To adjust the polarized relay place the pole shoes n and n' at a convenient distance apart, and then turn the screw B until the tongue b is brought as nearly as possible in the centre between the poles, so as to have equal room for adjustment on each side. The set screw D is then adjusted so that the motion of the tongue or armature lever shall be about $\frac{1}{10}$ of an inch between the insulated stud D' and the contact point. Adjusting screw E is then turned so that the armature, when no current is flowing, shall be slightly attracted by the pole bringing the tongue into contact with the agate point D'. If, after the instrument is

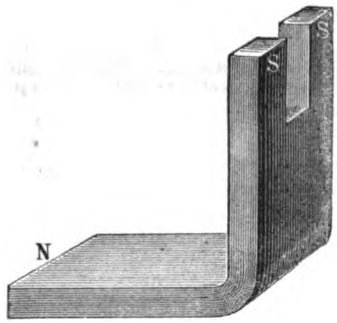


Figure 3.

so adjusted, the armature lever remains permanently in contact with the circuit closing point D when the distant station is sending, turn screw E to the right, so as to lessen the attraction of n and

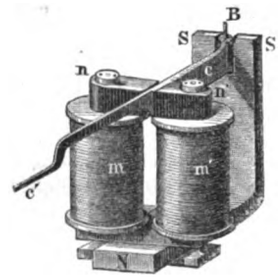


Figure 4.

increase that of n'. If this produces no effect, either place n a little farther from, or n' a little more to, the tongue or armature lever C' C until the desired result is obtained.

Sometimes this relay is combined with a galvanoscope, the same currents working both. On the top of the glass cover of the relay, under a small glass dome, is a single needle supported upon a point. When a current passes through the coils of the relay the polarization of the electro-magnet cores is altered, and the needle deflected. The operator who is receiving can therefore see when currents are arriving through the relay without employing a separate galvanoscope, as has hitherto been done.

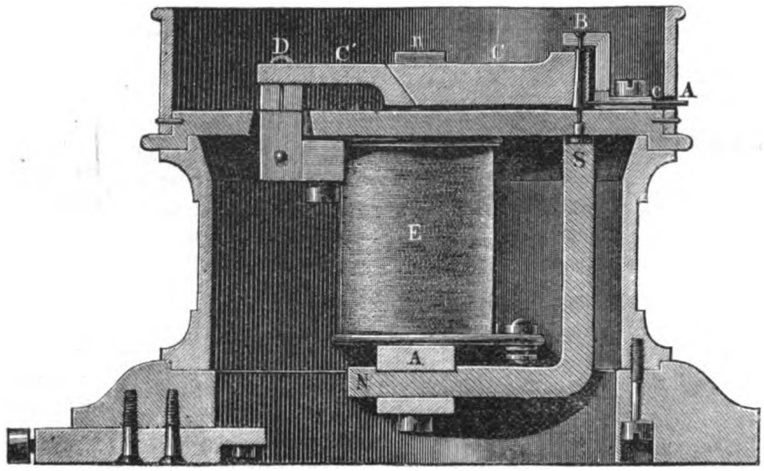


Figure 2.

SCIENCE—THE WORKER, THE APPLIER.

BY PROFESSOR JOHN TYNDALL, LL.D., F. R. S.

Dr. Tyndall concluded his course of lectures on Light at the Royal Institution, on Thursday, June 5, as he did also his lectures at New York, by a peroration, enforcing the paramount importance to material progress in the arts and manufactures of scientific research.

Science must be cultivated for its own sake, for the pure love of the truth, rather than for the applause or profit it brings. What was the motive that spurred on the men who have bequeathed to us the vast body of knowledge of which I have sought to give you some faint idea in these lectures? What the prize of their high calling for which they struggled so assiduously? What urged them to those battles and those victories over reticent Nature which have become the heritage of the human race? It is never to be forgotten that not one of those great investigators, from Aristotle down to Stokes and Kirchoff, had any practical end in view, according to the ordinary definition of the word "practical." They did not propose to themselves money as an end, and knowledge as a means of obtaining it. For the most part, they nobly reversed this process, made knowledge their end, and such money as they possessed the means of obtaining it. We may see to-day the issues of their work in a thousand practical forms, and this may be thought sufficient to justify it, if not ennoble their efforts. But they did not work for such issues; their reward was of a totally different kind. In what way different? We love clothes, we love food, we love fine equipages, we love money, and any man who can point to these as the result of his efforts in life justifies these efforts before all the world. He is a practical man. But I would confidently appeal to this assembly whether such things exhaust the demands of human nature? Given clothes, given food, given carriages, given money—is there no pleasure beyond what these can cover which the possessor of them would still covet? Your very presence here is an answer to my question. I need not tell such an assembly that there are joys of the intellect as well as joys of the body, or that these pleasures of the spirit constituted the reward of our great investigators. Led on by the whisperings of natural truth, through pain and self-denial, they often pursued their work. With the ruling passion strong in death, some of them, when no longer able to hold a pen, dictated to their friends the result of their labors, and then rested from them for ever.*

Could we have seen these men at work, without any knowledge of the consequences of their work, what should we have thought of them? To many of their contemporaries it would have appeared simply ridiculous to see men whose names are now stars in the firmanent of science straining their attention to observe an effect of experiment almost too minute for detection. To the uninitiated they might well appear as big children playing with not very amusing toys. It is so to this hour. Could you watch the true investigator in his laboratory, unless animated by his spirit, you could hardly understand what keeps him there.

Many of the objects which rivet his attention might appear to you utterly trivial; and, if you were to step forward and ask him what is the use of his work, the chances are that you would confound him. He might not be able to express the use of it in intelligible terms. He might not be able to assure you that it will put a shilling into the pocket of any human being living or to come. That scientific discovery may put not only pounds into the pockets of individuals, but millions into the exchequers of nations, the history of science amply proves; but the hope of its doing so is not the motive power of the investigator. It never can be his motive power. I know that I run some risk in speaking thus before practical men.

What, I would ask, are useful applications? Is man's body alone to be the object and arbiter of what is useful? Is there no nakedness of the mind to be clothed as well as nakedness of the body?—no hunger and thirst of the intellect to satisfy? Surely no two terms were ever so much distorted and misapplied with reference to man in his higher relations than these terms useful and practical. Let us expand the definitions of these terms until they embrace all the needs of man, his highest intellectual needs inclusive. It is specially on this ground of its administering to the higher needs of the intellect; it is mainly because I believe it to be wholesome as a source of knowledge, and as a means of discipline, that I urge the claims of science upon your attention.

But, with reference to material needs and joys, surely pure science has always a word to say. People sometimes speak as if steam had not been studied before James Watt, or electricity before Wheatstone or Morse, whereas, in point of fact, Watt and Wheatstone and Morse, with all their practicality, were the mere outcome of antecedent forces, which acted without reference to practical ends.

At the present time there is a cry for technical education, and it is the expression of a true national want; but there is no outcry for original investigation. Still without this, as surely as the stream dwindles when the spring dries, so surely will their

* Stephen Gray, on his death bed, described to a Committee of the Royal Society his electrical researches.

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technical education lose all force of growth, all power of reproduction.

To keep society, as regards science, in healthy play, three classes of workers are necessary. Firstly, the investigator of natural truth, whose vocation it is to pursue that truth, and extend the field of discovery for the truth's own sake, and without any reference to practical ends. Secondly, the teacher of natural truth, whose vocation it is to give public diffusion to the knowledge already won by the discoverer. Thirdly, the applier of natural truth, whose vocation it is to make scientific knowledge available for the needs, comforts and luxuries of life. These three classes ought to coexist, and interact upon each other.

Now, the popular notion of science often relates not to science strictly so-called, but to the applications of science. Such applications are so astounding—they spread themselves so largely and umbrageously before the public eye—as to shut out from view those workers who are engaged in the profounder business of discovery.

Take the electric telegraph as an example, which has been repeatedly forced upon my attention of late. I am not here to attenuate in the slightest degree the services of those who, in England and America, have given the telegragh a power so wonderfully fitted up for public use. Assuredly they earned a great reward, and assuredly they have received it. But I should be untrue to you and to myself if I failed to tell you that, however high in particular respects their claims and quality may be, practical men did not discover the electric telegraph. The discovery of the electric telegraph implies the discovery of electricity itself, and the development of its laws and phenomena. Such discoveries are not made by practical men, and they never will be made by them, because their minds are beset with ideas which, though of the highest value from one point of view, are not those which stimulate the original discoverer. The ancients discovered the electricity of amber, and Gilbert, in the year 1600, extended the force to other bodies.

Then followed other inquirers. But this form of electricity, though tried, did not come into use for telegraph purposes.

There appeared the great Italian, Volta, who discovered the source of electricity which bears his name, and applied the most profound insight and the most delicate experimental skill to its development. Then arose the man who added to the powers of his intellect all the graces of the human heart, Michael Faraday, the discoverer of the great domain of magnets, electricity. Œrsted discovered the deflection of the magnetic needle, and Arago and Sturgeon the magnetization of iron by the electric current. The voltaic circuit finally found its theoretic Newton in Ohm, while at Princeton, Henry pushed forward the course of experimental inquiry.

Here you have all the materials employed at this hour in all the forms of the electric telegraph. Nay, more: Gauss, the celebrated astronomer, and Weber, the celebrated natural philosopher, both professors in the University of Gottingen, wishing to establish a rapid mode of communication between the observatory and the physical cabinet of the university, did this by means of an electric telegraph. The force, in short, had been discovered, its laws investigated and made sure, the most complete mastery of its phenomena had been attained, nay, its applicability to telegraphic purposes demonstrated by men whose sole reward for their labors was the noble joy of discovery, and before your practical men appeared at all upon the scene.

Are we to ignore all this? We do so at our peril. For I say again, that, behind all your practical applications, there is a region of intellectual action to which practical men have rarely contributed, but from which they draw all their supplies. Cut them off from this region, and they become eventually helpless. In no case is the adage truer, "Other men labored, but ye are entered into their labors," than in the case of the discoverer and the applier of natural truth.

CORRESPONDENCE.

STUPIDITY, OR WHAT?

To the Editor of the Journal of the Telegraph:

Late on the night of June 29th, we received at this office a message from San Luis Potosi, Mexico, addressed Rodolpho Pigeon or Pirgeon, 93 Old Levee street. Knowing that there is no such street in New York, and the gentleman's name not appearing in our City Directory, I gave the message to one of my best messengers, and directed him to inquire at the Mexican Consul's, to see if he knew of any such person. The party was not known at the Consul's, and the message was returned to me undelivered.

Knowing that there is such a street as Old Levee street in New Orleans, I asked that office, at 9.45 A. M., June 30th—as stated in the previously printed communication—and received his reply at 1.35 P M., same day.

My reasons for pursuing this course were: 1st, because I was almost certain that the message was "bulled," and intended for New Orleans, not New York; 2d, because the Mexican lines are nearly always out of order, and it frequently takes three or four days, and sometimes a week, to get any reply from offices on that line. For this reason, I did *not* notify the sending station that the message was undelivered, and ask that station for better address, as is usual in such cases.

In conclusion, I beg to say that, by my course in this case, I avoided the necessity of sending one office message to San Luis Potosi (nearly double the distance to New Orleans) and one reply from that office. I also avoided a delay in delivery of from one day to one week. As this communication evidently comes from New Orleans, I think that office should investigate, how it was possible that a message from Mexico, sent to New Orleans for delivery at 93 Old Levee street, is allowed to pass through that office and come to New York, compelling me to return the message to that office by telegraph, and in this particular case acting as delivery clerk for New Orleans office.

I now submit the above to a fair and candid consideration, and ask, was this *stupidity, or what?*

J. D.

To the Editor of the Journal of the Telegraph:

In an article in the JOURNAL of July 1st the suggestion is made, that each office be supplied with mourning blanks and envelopes, to be used only for death messages. Perhaps, if "K." would try this plan, it would answer just as well.

I always write the word "*Death*" in large, plain letters on the envelope containing such a message; it takes but a moment to do it, and, I think, answers the same purpose as a mourning envelope.

It is quite interesting to read the different opinions of operators in regard to a change in the telegraphic alphabet.

I am not going to say which is best for the Company to adopt, because I don't know, but, in only a few years' experience, I do not see how a careful operator can make mistakes with the Morse alphabet.

M.

PHILADELPHIA, Aug. 7th, 1873.

To the Editor of the Journal of the Telegraph:

With your permission I will give my view upon the "Proposed Change of Alphabet." The prevailing opinion among operators, judging from the JOURNAL's correspondence column, seems to be, that errors occurring in transmitting messages arise from the use of spaced letters in our alphabet. Now, in my limited experience, I find such is not altogether the case, although, at the first glance, those much abused spaced letters seem to be the sole cause. Upon investigation, I find *the trouble proceeds from certain letters being formed from a combination of the dot letter E with the space letters.* To illustrate, - - - - S. E. combined, form Z., as also - . - E. S. form, and the cause of the Gill and Pie error. Now, do away with the dot letter, and errors of that kind cease, and then terms will not be misconstrued into toims, as was the case a few weeks since. Substitute - - — — for - E, and our alphabet is perfect, as far as space letters are concerned. I know such a change would be received with much opposition, on account of the frequent occurrence of the letter E, and the extra amount of time it would take to transmit it. But as "A.," of San Francisco, says: "If a message can be received in sixty seconds with one alphabet, and there is any greater ease and certainty in another alphabet, which requires sixty-one seconds, the latter might be preferable, *speed* wthin certain limits, being subordinate to ease and security." This I believe to be the correct view to take. Suppose we can work faster with our Morse alphabet than any other, does the income accruing from the extra amount of business transmitted by it equalize those costly errors the Western Union Company have to pay for? I think not. There is one other letter that gives considerable trouble to operators generally—the single dash letter T or L. If they were always properly made, no trouble could arise, but they are not, and it is doubtful if they ever will be. Experts judge from the context what letter is intended, and young operators, who "won't break," occasionally get it down wrong.

We could use - ——— for L, retaining the single dash for T, thus perfecting our alphabet, by making only two slight changes instead of a dozen or more, as would be the case if we adopt the Continental Code.

W. T. B.

To the Editor of the Journal of the Telegraph:

Suppose a party came in the office with a message to J. Camp & Co., Philadelphia, Pa., no number or street on message, and party neither knows number nor street, are we bound to receive the message and forward it? A case here in this city is in dispute. The rules of the Company are not explicit on this point.

B. S.

You are bound to receive the message and send it forward. The number and street would probably be found in the Directory.

NORTHVILLE, Mich., June 9, 1873.

To the Editor of the Journal of the Telegraph:

I do not think the Morse alphabet needs changing. Operators should be more careful in sending the spaced and initial letters. I like the suggestion of your correspondent, in regard to a stop after initial letters, but would suggest the use of our comma . — . —as being shorter and more likely to be understood than the continental .. .. .. How many of the 5,000 R. R. offices are under the immediate control of R. R. Superintendents? I would like to hear from these superintendents. My opinion is that very few of them would consent to change, and unless they do change, we, who work on railroad lines, would have to do railroad business by Morse, and work with Western Union repeating offices by some other alphabet.

A.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY.

June, 1873.

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W. J. Burns .....145 Broadway.
J. J. Bates..... "
J. F. Cleverdon..... "
E. M. Fox..... "
W. J. McCormick..... "
D. B. Mitchell..... "
R. J. McCarthy..... "
J. O'Brien..... "
G. W. Sawyer..... "
O. F. Stow..... "
F. A. Warner..... "
F. Newhouse..... "
D. O'Connor..... "
Miss J. Pierson..... "
Miss S. A. Litzenstatter..... "
Miss Susie Wallace..... "
Miss C. Brier.....Hoffman House.
Miss A. F. Elliott.....Yorkville.
Miss Lucy Lavine.....Grand Hotel.
Miss Carrie Merchant.....Everett House.
Miss Alice J. Palmer.....St. Cloud Hotel.
Miss L. Streachen.....Astor Place.
J. H. Casey.....Dry Dock.
T. F. Keller.....Washington Market.
J. J. Johnson.....22 Broad St.
H. F. McComb.....Grand Central Depot.
J. Swann.....21 Wall St.
C. B. Hoff.....6th Ave. and 43d St.
Miss C. R. Welsh.....Greenpoint, L. I.
Miss H. A. Hanscom.....Bath, Me.
L. F. Crane.....Mattawamkeag, Me.
Miss D. J. Wood.....Dexter, "
M. M. Dinsmore.....No. Anson, "
T. L. Noble.....Dundee, N. Y.
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Geo. F. Clark.....Ithaca, "
B. H. Griffin.....Rochester, "
M. E. Humphrey..... " "
W. H. Doolittle.....Sharon Springs, N. Y.
Geo. Carroll.....Suspension Bridge, "
J. R. Moore.....Trenton Falls, "
E. M. Allen.....Utica, "
L. F. Butz.....Watkins, "
E. H. Dunis.....Albany, "
Chas. Daly..... "
Miss P. A. Lewis.....Cornwall, "
J. W. Little.....Brewsters, "
Miss Alice Sykes.....Ft. Washington, "
E. D. Stephens.....Hudson, "
E. Beers.....Lebanon Springs, "
E. J. Buxton.....Lake Mahopac, "
Geo. Schneider.....Lake George, "
G. A. Sharp.....Saratoga, "
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Jno. W. Hermance.....West Point, N. Y.
Miss A. Sweet.....Blackstone, Mass.
Miss Emma Vialle.....Boston, "
Miss Dora Eastman..... " "
J. C. Wilson..... " "
J. T. Lemoine..... " "
W. E. Kettles..... " "
F. A. Corey..... " "
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Wm. Wild.....Newport, R. I.
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T. F. Carr..... " "
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Miss H. M. Arnold.....Wickford, R. I.
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J. Waterbury.....Stamford, "
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R. B. Eastman.....Manchester, N. H.
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J. H. Cumings.....Paterson, N. J.
Jas. Johnson.....Annapolis, Md.
Jno. D. Fiske.....Baltimore, "
T. H. Smith..... " "
W. A. Wells.....Cape May, N. J,
C. Duffell.....Camden, "
W. E. Homer.....Clearfield, Pa.
Isaac Kenedy.....Deal, N. J.
M. A. Mack.....Elizabeth, N. J.
Philo Zingley.....Gloucester, "
R. H. Zubler.....Hoboken, "
J. L. Crone.....Mt. Clair, "
E. W. Russell.....Ocean Grove, N. J.
Jno. Dogle.....Princeton, "
W. H. Bevelin.....Trenton, "
D. C. Blair.....Halifax, Pa.
Isaac Kunkle.....Lykers, "
Jno. H. Boyce.....Pottsville, Pa.
Miss R. Gill.....Philadelphia, Pa,
Sam'l Yoder..... " "
Frank Gessner..... " "
R. P. McCarthy.....Sunburg, "
E. F. Bond.....Tower City, "
Jno. Saylor.....Wilkesbarre, "
Jno. Parley.....Berkeley Springs, W. Va.
J. H. Hopkins.....Deer Park, "
E. Reynolds.....Tunnelton, "
W. B. La Mar.....Green Springs Run, "
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J. L. Ballantine.....Galesburg, "
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H. Burton..... " "
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D. T. Brown.....Sioux City, Ia.
R. A. Myers.....Chicago, Ill.
J. P. Mansfield..... " "
F. Richardson..... " "
M. A. Huyck..... " "
R. E. Burns..... " "
L. P. Voorhies..... " "
A. R. Pippit.....Ft. Scott, Ks.
Miss Annie Griggs.....Junction City, Ks.
Jno. E. Clark.....St. Louis, Mo.
J. C. McIlwaine..... " "
C. E. White..... " "
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H. M. Burrell.....Pittsburgh, "
O. C. Camp..... " "
S. S. Wolf..... " "
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F. G. Brown..... " "
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D. S. Graham.....Jackson, "
A. Brunk.....Lexington, "
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C. W. Peterson.....Indianapolis, Ind.
H. C. Hunt.....Terra Haute, "
J. F. Voorhies.....Buena Vista, O.
J. F. Wilson.....Columbus, "
Jeff. Towns.....Haverhill, "
W. H. Gibson.....Vincennees, Ind.
G. W. Temple..... " "
J. F. Nagle.....Black Hawk, Cal.
Joe Hood.....Divide, "
E. H. Collins.....Idaho, "
E. D. Hay.....Pueblo, "
M. Shillings.....Black Rock, Idaho.
R. Christian.....Camp Douglass, Idaho.
E. H. Collins.....Idaho, Col.
R. L. Garlick.....Omaha, Neb.
E. E. Duke.....Alleghany Springs, Va.
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W. B. Waldron.....Hot " "
J. W. McIndoe.....Jordan R. A. " "
B. Whiting.....Laurenberg, N. C,
D. P. Beckman.....Montgomery Springs, Va.
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H. F. Lines.....Sweet Chalybeate " "
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G. W. Vernon.....Boonsacks, "
C. E. Williams.....Mt. Olive, "
Brown Ayres.....Rockbridge Baths, Va.
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W. D. Connell.....Mayhew, "
T. L. Wainwright.....Stonewall, Miss.
W. Allen.....Alabama Furnace, Ala.
W. J. Bodell.....Fort Monroe, Va.
W. H. Williams.....Ironton, Ala.
T. J. Woolf.....Selma, "
D. E. Lockhart.....Atlanta, Ga.
E. C. Allen.....Bowling Green, Ky.
A. A. Roy.....Jordan, "
Z. J. Nutt.....Louisville, "
A. H. McLeod.....Moscow, "
Harvey Pride.....Nashville, Tenn.
T. M. Jackson.....Shreveport, La.
B. F. Ober.....Chef Menteur, La.
H. C. Davis.....New Orleans, "
H. H. Du Sanchet.....Galveston, Tex.
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Chas. Chase.....Houston, "
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Susie Wainwright.....San Leandro, "
J. B. Blackburn.....Callahans, "
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W. A. Langhorne.....Mineral Hill, "
E. G. Thomas.....Eureka, "
Wm. Cohn.....Reno, "
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S. Willard.....Plymouth, Cal.
S. S. Crafts.....Alleghany, "
Van W. Phillips.....Antioch, "
Miss Hayes.....San Diego, "
S. B. Riggen.....San Buena Ventura, Cal.
Carrie J. Fletcher.....Menlo Park, "
J. G. Edwards.....Sacramento, "
J. H. Phyfer.....Ophir, Utah.
H. P. Olds.....Eldorado, Cal.
Jesse H. Story.....Volcano, "
B. R. Bates.....Oakland, "

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T. J. Powers..... "
D. Collins..... "
J. A. McDonald..... "
F. Peters..... "
S. S. Smith..... "
B. S. Story, Jr..... "
R. G. W. Dennison..... "
J. W. Morrison..... "
Miss Sarah Dresser..... "
Miss Sarah McCormick..... "
Miss Johanna Wroeger.....St. Cloud Hotel,
James Smith.....21 Wall street,
Miss Annie Gray.....Astor Place.
G. F. Lane.....Washington Market.
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C. McCormick.....Mattawamkeag, Me.
G. H. Fletcher.....N. Anson, "
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Henry Levy..... "
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Dennis Hartman, Jr.....Boston, "
J. F. Cleverdon..... "
H. E. Thompson..... "
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C. L. Weedon..... "
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A. B. Hunt.....Weymouth, Mass.
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H. L. White.....Liecester Jc., Vt.
Lorenzo Chase.....Nashua, N. H.
F. B. Livingston.....Rutland, Vt.
Miss M. J. Gilmon.....Tamworth, N. H.
F. H. Stephens.....White River Jc., Vt.
W. H. Harrison.....Anapolis, Md.
G. B. Kimberly.....Baltimore, "
G. N. Doft..... "
J. H. Crowly..... " "
Jno. Campbell.....Carlisle, Pa.
A. Reigle.....Pottsville, Pa.

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W. H. Pearson.....Elizabeth, "
J. G. Pinkerton.....Hoboken, "
E. Bishop.....Mount Clare, N. J.
Miss A. Fottrell.....Princeton, "
E. G. Thompson.....Bloomington, Ill.
C. H. Tubbs.....Galesburg, "
A. M. Stephenson.....Manteno, "
G. A. Sharp.....Milwaukee, Wis.
T. W. Cox.....Ottumwa, Ia.
W. F. Sedgwick.....Sioux City, Ia.
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Miss H. Giddongs.....
Miss Emma Stanton.....
E. G. Foote.....
C. T. Roote.....
J. F. Tobin.....
C. M. Clark.....Fort Scott, Ks.
Miss Anna Grigg.....Junction City, Ks.
C. W. Dickey.....St. Louis, Mo.
A. G. Campbell.....
M. Ryan.....Dead Pittsburgh, Pa.
C. Thompson.....Buffalo, N. Y.
S. D. Morse.....Cleveland, O.
J. M. Schnell.....Lexington, Miss.
A. S. Van Gilder.....Warren, O.
J. R. Taylor.....Wenona, Mich.
Robt. Livingstone.....Indianapolis, Ind.
T. S. Carr.....Terre Haute, "
G. O. Morse.....Cincinnati, O.
P. L. Ryder.....Columbus, "
G. H. Ford....."Dead" Haverhill, O.
C. H. Vautor.....Vincennes, Ind.
A. F. Knight.....
P. J. Gilman.....North Platte, Neb.
J. A. McKenna.....Omaha, "
W. J. Bailley.....Black Hawk, Col.
J. Lewis.....Divide, "
Charles Orton.....Pueblo, "
H. G. Skinner.....Bryan, Wy.
C. W. Geathart.....Camp Douglass.
C. H. Seymour.....Idaho, Col.
J. S. Angell.....Amelia C. House, Va.
L. B. Pennington.....Laurenburgh, N. C.
H. A. Ashmore.....London, Ten.
G. L. Davis.....Savannah, Ga.
J. W. Marshall.....Covington, Ga.
W. J. Nelson.....Dead" Montgomery, Ala.
G. R. Stanton.....Selma, Ala.
J. H. Bard.....Bowling Green, Ky.
J. W. Kernon.....Jordan, "
J. M. Barnes.....Moscow, "
G. W. Snyder.....Monroe, "
E. M. Fox.....
J. T. Hull.....Shreveport, "
J. L. Church.....Chef Menteau, "
Frank Lee.....Hammond, "
F. W, Blattner.....Jacksonville, Tex.
C. W. Cosnahan.....Dallos, "
G. J. Nutt.....Galveston, "
J. Bosquet.....
J. B. Denny.....
H. L. Bross.....
B. Ellis.....
Jno. Koutz.....
J. Tuttle.....
S. Chapman.....
A. A. Bayley.....
M. F. Smith.....
Wallace Coffin.....
S. Tripp.....
S. Hanford.....

TRANSFERS.

Name.	*From.*	*To.*
J. G. Ballard	21 Wall St.	Long Branch, N. J.
Miss Emma A. Burgess	134 Pearl St.	Ashland House.
Miss Emma A. Byrne	14th St. and 3d Ave.	Everet House.
B. C. Edwards	Hoffman House	St. Nicholas Hotel.
L. M. Ebell	Greenpoint, L. I.	Canal St.
J. J. Gartlan	21 Wall St.	Washington Market
Miss Mary L. Graff	23d St. and 8th Ave	145 Broadway.
G. Irving	30th St.	Canal St.
L. Kirshbaum	21 Wall St.	Long Branch, N. J.
C. F. Lanny	Astor House	Warren St. & B'way
G. A. Mudgett	22 Broad St.	Washington Market
Miss Frank A. Pike	145 Broadway	Flatbush, L. I.
Miss Hattie Reger	St. Cloud Hotel	Yorkville.
W. A. Seymour	Madison Ave	B'way and 6th Ave.
R. G. Wilson	145 Broadway	21 Wall St.
C. E. Arnold	Albany, N. Y.	Lake George, N. Y.
S. Laurence	Hudson, "	Catskill Mountain House, N. Y.
Miss J. Pearson	Ft. Wash'ton, N. Y.	New York.
Miss M. A. Costelloe	Williamstown, "	New Lebanon, N. Y.
J. Bierhardt	Rochester, "	Syracuse, "
J. Waterbury	Duncan, Ct.	Stamford, Ct.
Miss M. F. Hollbrook	Forrest Hill, Mass.	Neponsett, Mass.
M. E. Lincoln	Greene, R. I.	Providence, R. I.
F. P. Doolittle	Meriden, Ct.	Springfield, Mass.
A. G. Rider	Springfield, Mass.	Tiverton, R. I.
Henry Comb	Westfield, "	Meriden, Ct.
T. H. McPhil	Plaister Cove, C. B.	Antigonishe, N. S.
C. F. Cameron	Antigonishe, N. S.	Plaister Cove, C. B.
F. A. Sorey	Athol, Mass.	Boston, Mass.
D. J. Eastman	Manchester, N. H.	" "
F. W. Gary	So. Ashburnham, Mass.	Rutland, Vt.
E. F. Bond	Baltimore, Md.	Towsontown, Md.
J. F. Boyce	Gloucester, N. J.	Pottsville, Pa.
J. A. Hartman	Jersey City, "	Atlantic City, N. J.
A. A. Ziegler	Philadelphia, Pa.	Carlisle, Pa.
M. C. Gross	" "	Jersey City, N. J.
W. H. McElroy	" "	Atlantic " "
P. V. DeGraw	" "	Cape May, "
H. W. Clark	Sunbury, "	Jersey City, "
James Mellon	Tower City, "	Baltimore, Md.
O. M. Hamrick	Wilkesbarre, Pa.	Philadelphia, Pa.
E. J. Duncan	Foxburg, "	E. Brady's Bend, Pa.
H. L. Erdman	St. Petersburg, Pa	Hollidaysburg, "
J. C. Wilson	Buffalo, N. Y.	Boston, Mass.
James Hall	Jackson, Mich	Detroit, Mich.
Lee Mantle	Summit, Idaho	Pleasant Valley, Id.
W. J. Vernon	Bonsacks, Va.	Glade Springs, Va.
C. P. Hill	Weldon, N. C.	Sweet Springs, "
J. V. Rhodes	Barnetts, Ga.	Covington, Ga.
M. S. Williams	Savannah, Ga.	Macon, "
J. B. Bennett	Redding, Cal.	Sacramento, Cal.
Jas. McCormick	San Leandro, Cal.	Redding, "
Thos. George	Sacramento, "	Stockton, "
B. Howes	Bakersfield, "	Portersville, "
Jno. Henderson	Pioche, Mo.	Salt Lake, Utah.
J. L. Sears	Hamilton, Mo.	Pioche, Mo.
W. R. Forrest	Sacramento. Cal.	Hamilton, Mo.
J. C. Oldham	Elko, Mo.	Palisade, "
H. M. Bennett	Oakland, Cal.	Sacramento, Cal.

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

The acknowledgment of receipt of any assessment is to be understood as an acknowledgment for all previous assessments:

ACKNOWLEDGMENT OF RECEIPTS FOR ASSESSMENTS 44, 45 AND 46 UP TO AUGUST 13TH.

13, 22, 26, 33, 37, 54, 61, 67, 70, 72, 74, 75, 80, 82, 88, 89, 90, 93, 95, 97 98, 101, 107, 108, 120, 134, 136, 139, 141, 142, 144, 146, 166, 169, 179, 181, 183, 188, 189, 190, 191, 193, 197, 198, 200, 218, 220, 231, 240, 244, 247, 254, 255, 256, 257, 267, 277, 289, 303, 311, 323, 328, 330, 350, 353, 354, 367, 371, 372, 376, 378, 379, 385, 388, 391, 406, 416, 430, 431, 434, 438, 456, 463, 466, 468, 469, 470, 471, 474, 475, 481, 482, 514, 516, 526, 527, 548, 552, 554, 560, 565, 569, 574, 576, 577, 579, 587, 594, 603,604, 622, 628, 636, 646, 649, 655, 656, 662, 663, 664, 665, 669, 670, 672, 684, 685, 690, 694, 702, 708, 711, 714, 715, 725, 735, 737, 738, 741, 750, 751, 756, 772, 778, 803, 812, 820, 825, 831, 842, 848, 855, 858, 859, 869, 870, 873, 883, 899, 908, 911, 915, 922. 938, 939, 942, 952, 976, 995, 998, 1005, 1008, 1011, 1013, 1023, 1024, 1039, 1044, 1055, 1056, 1058, 1073, 1074, 1075, 1076, 1081, 1085, 1099, 1102, 1144, 1147, 1148, 1152, 1155, 1156, 1157, 1159, 1160, 1162, 1164, 1178, 1185, 1193, 1194, 1204, 1222, 1225, 1226, 1227, 1231, 1237, 1238, 1239, 1240, 1241, 1259, 1262, 1263, 1267, 1270, 1273, 1282, 1287, 1288, 1292, 1294, 1307, 1308, 1309, 1311, 1312, 1313, 1314, 1315, 1317, 1318, 1319, 1320, 1321, 1322, 1325, 1345, 1353, 1354, 1355, 1358, 1360, 1363, 1364, 1365, 1372, 1376, 1383, 1399, 1407, 1412, 1417, 1418, 1419, 1425, 1426, 1437, 1438, 1440, 1449, 1451, 1452, 1453, 1454, 1455, 1456, 1459, 1461, 1462, 1484, 1487, 1500, 1501, 1506, 1507, 1508, 1511, 1515, 1516, 1517, 1519, 1522, 1524, 1532, 1537, 1539, 1542, 1543, 1552, 1555, 1558, 1559, 1565, 1580, 1582, 1585, 1590, 1593, 1594, 1610, 1611, 1612, 1614, 1615, 1623, 1625, 1626, 1629, 1644, 1652, 1656, 1660, 1661, 1662, 1663, 1665, 1680, 1681, 1682, 1684, 1685, 1687, 1688, 1699, 1709, 1710, 1711, 1713, 1719, 1720, 1731, 1732, 1734, 1738, 1738, 1738, 1745, 1763, 1773, 1774, 1775, 1791, 1794, 1795, 1796, 1797, 1798, 1799, 1800, 1804, 1811, 1812, 1813, 1814, 1815, 1817, 1823, 1824, 1831, 1839, 1840, 1841, 1842, 1844, 1845, 1847, 1848, 1852, 1867, 1768, 1869, 1872, 1882, 1883, 1884, 1900, 1901, 1908, 1911, 1912, 1913, 1914, 1915, 1916, 1920, 1921, 1923, 1924, 1925, 1926, 1927, 1957, 1965, 1966, 1969, 1984, 1987, 1994, 2002, 2014, 2015, 2023, 2024, 2036, 2038, 2045, 2048, 2058, 2059, 2060, 2072.

FOR 43 AND 43.

294, 847, 766, 1134, 1135, 1136, 1234, 1722, 1778, 1779, 1780, 1916, 1930, 1952, 1973.

FOR 44.—1040.

FOR 45.—1251, 2041.

The following statement shows the amounts paid in under the assessments of June 7th:

No. 42. for the benefit of the heirs of J. R. Dunlap.....$1,255 00

No. 43, for the benefit of the heirs of F. S. Belden.....1,275 00

We are notified of the death of Robt. S. Fowler, which occurred at Dubuque, Ia., on July 21st; also that of Wm. P. Trites, at Monroe, La., July 29th.

DIED.

WELTER.—At Summit, N. J., August 6th, Eddie George, only child of T. S. and Carrie C. Welter, aged 5 months and 23 days.

Dearest Eddie, thou hast left us,
And thy loss we deeply feel:
But the hand that has bereft us
Will in time our sorrow heal.

ELECTRIC BALANCE AND AN ELECTRO-STATIC PHENOMENON.—*M. Volpicelli.*—The law of electro-static action revealed by Coulomb's balance depends on a considerable number of causes or forces, as follows: 1. Repulsion or attraction between the electric charges. 2. Curvilinear induction between the two spheres. 3. Rectilinear induction between them. 4. The attraction of the substances surrounding the spheres. 5. Electrization of the insulating rods. 6. Non-uniformity in the distribution of electricity on the spheres. 7. Want of reciprocal rectilinear action of the parts of the charge distributed on the surfaces not facing each other. 8. Increase of the initial charges through induction of one sphere on the other. 9. The circumstance that one may not refer entirely to the centre of one of the two spheres the electric charge which acts on the other. 10. The loss during experiment, of part of the induced electricity of the first kind, and the diminution thus produced. 11. The imperfect elasticity of the suspension thread, its variability with temperature, and its hygrometric state (if not metallic). Thus it appears that the two investigations of the law, one mathematical, the other experimental, are hardly comparable. M. Volpicelli adds some remarks on an experiment described thus in *Les Mondes:* "Let the knob of a gold-leaf electroscope be touched with a bar of vulcanized caoutchouc electrified negatively by rubbing with cat-fur; then remove the rod. Next bring near to the knob a body electrified negatively; the divergence of the leaves diminishes. This phenomenon would be inexplicable if the electroscope were charged negatively. Experiment shows, then, that after removal of the rod there remains an excess of positive fluid." He asks, whence this positive excess, and traces it to the fact that electrified non-conductors, unless moistened, do not communicate their electricity to metals they touch, but act merely by induction.

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THE RATES OF POSTAGE.

[*From and after July* 1, 1873.]

Postal cards, one cent each, go without further charge to all parts of the country.

Postal cards can be sent to Canada, New Brunswick, Nova Scotia, or Prince Edward's Island, by putting on a one-cent stamp.

All letters, to all parts of the United States, 3 cents per half-ounce.

Local or "drop" letters—that is, for the city or town where deposited—2 cents if delivered by carriers, and 1 cent if there is no carrier system.

For newspapers and magazines, regularly issued and sent to regular subscribers, the following rates per quarter of three months, payable in advance at the office where received:

Dailies	35 cents.
Six times a week	30 cents.
Tri-weeklies	15 cents.
Semi-weeklies	10 cents.
Weeklies	5 cents.
Semi-monthlies, not over 4 ozs	6 cents.
Monthlies, not over 4 ozs	3 cents.
Quarterlies, not over 4 ozs	1 cent.

Books, 2 cents for each 2 ounces, or fraction thereof.

All other printed or miscellaneous matter, as pamphlets, transient newspapers, handbills, circulars, proof-sheets, photographs, book manuscripts, etc., and also seeds, cuttings, bulbs and roots, 1 cent for each two ounces, or fraction thereof, always to be pre-paid. Copies of the JOURNAL come within this limit of two ounces, and the postage upon irregular numbers is 1 cent each.

Manuscript for publication in newspapers, magazines, etc., is subject to letter postage.

Undelivered letters can be re-sent to a new address without additional charge.

Stamps cut from stamped envelopes are rejected by the post office.

Letters to all parts of the New Dominion (Canada), 10 cents per half ounce, if unpaid; paid, 6 cents; newspapers, 2 cents each.

The following are the postal rates with Europe, pre-payment in the case of letters being optional, that of newspapers compulsory. Unless otherwise indicated, the rates for letters are for the half ounce, or fraction thereof, and those for newspapers for four ounces, or fraction thereof:

To Great Britain and Ireland, letters, 6 cents; newspapers, 2 cents. France, letters, direct mail, 10 cents; *via* England, for one-third ounce and under, 10 cents; from one-third to one-half ounce, 16 cents; newspapers, 2 cents each. Spain, letters, under one-third ounce, 16 cents; one-half ounce and under, 28 cents; newspapers, 2 cents each. All parts of Germany, including Austria, letters, direct mail, 6 cents; closed mail, *via* England, 7 cents; newspapers, 4 cents. Denmark, letters, direct mail, 9 cents; newspapers, 2 cents each. Switzerland, letters, direct mail, 10 cents; *via* Bremen or Hamburg, 8 cents; newspapers, 4 cents. Italy, letters, direct mail, 10 cents; newspapers, 4 cents. Russia, letters, direct mail, 11 cents; closed mail, *via* England, 12 cents; newspapers, 6 cents. Norway, letters, direct mail, 11 cents; closed mail, *via* England, 12 cents; newspapers, 8 cents. Sweden, letters, direct mail, 10 cents; closed mail, *via* England, 11 cents; newspapers, 8 cents. Turkey, European and Asiatic, letters, direct mail, 11 cents; closed mail, *via* England, 12 cents; newspapers, 7 cents. Egypt, letters, direct mail, 16 cents; closed mail, *via* England, 17 cents; newspapers, 9 cents.

For Asiatic countries, the half-ounce limit for letters, and the four ounces for newspapers, still holding good:

To Australia, letters, *via* Southampton, 16 cents; *via* Brindisi, 22 cents, to be pre-paid; newspapers, 4 and 8 cents by the respective routes. British India, letters, *via* San Francisco, 10 cents; *via* Southampton, 22 cents; *via* Brindisi, 28 cents, to be pre-paid; newspapers, *via* San Francisco, 2 cents each; by the other routes, 6 and 8 cents, respectively, per four ounces or fraction. China, letters, *via* San Francisco, 10 cents; *via* Brindisi, 23 cents, to be pre-paid; newspapers, 2 cents each. Japan, letters, *via* San Francisco, 10 cents; *via* Brindisi, 34 cents, to be pre-paid; newspapers, 2 cents each by the former route, and 8 cents per 4 ounces by the latter.

AUGUMENTATION OF THE INDUCTION SPARK.

Everybody is acquainted with the experiment which consists in placing in communication the two coatings of a Leyden jar with the two ends of the secondary wire of an induction coil. The length of the spark is reduced considerably, but the brilliancy and noise are, on the contrary, increased.

I wished to see the effect of large insulated metallic surfaces, placed in contact with the two ends of the secondary wire, the two surfaces being separated from each other, so as not to produce the effect of a condenser.

For metallic surfaces I took frames having each about eleven square feet covered with silk, doubled with paper, upon which had been fixed plates of tin. The spark burst between two insulated points, which can be made to approach or recede from each other at will.

So long as one or more plates of tin communicate with one of the poles only, the spark is in no way modified; but so soon as the other pole of the secondary wire is in contact with the plates of tin of the same surface as the first, the brilliancy of the spark increases and its length diminishes. The increase of the surface produces an increase in the brilliancy and the noise of the spark, and a new diminution in its length. If one of the metallic surfaces be greater than the other, the effect does not surpass that which two surfaces equal to the smallest produce.

The effect of the plate becomes more sensible by the drawing near of the points of the excitor, and the spark breaks out into a great number of tracks of fire; but if the distance of the points is reduced to about one and a half inches, the effect of the surface seems to disappear.

When in place of the large metallic plates, metallic wires or ribbons of tinsel are employed, three-fourths to one inch in width, well insulated by means of glass supports or silk cords, we then obtain, by the use of equal surfaces, much more intense effects.

Fifty-four yards of these metallic ribbons, placed in contact with each end of the secondary wire, making a total of 108 yards, greatly increase the brilliancy and the noise of the spark.

The stronger the induction, the more marked the effect; this is what I have proved lately, by means of a powerful apparatus, which M. Ruhmkorff has been good enough to place at my disposal. It is necessary to be careful, in order to obtain the greatest possible effect, to make the two ends of the metallic ribbon communicate with each point. If the ribbon be too long, it becomes necessary to establish a greater number of similar communications.

In general the effects are the much more intense when the insulated metallic surfaces are greater, more divided, and the different parts are more separated from each other.—*C. M. Guillemin, in Journal de Physique.*

FOREIGN TELEGRAPHIC ITEMS

THE WEST INDIA AND PANAMA TELEGRAPH CO.

A circular was issued on the 3d of May to the shareholders of the West India and Panama Telegraph Company, inviting subscriptions at par, in shares of £10 each, for the £250,000 Preference Share Capital bearing 10 per cent., recently authorized, to restore and complete the Company's property. The circular calls special attention to the facts that the ordinary share capital issued and fully paid up is £571,910; that the only debenture capital authorized is £50,000; that the Company's system extend altogether to about 1,800 miles, and possess subsidies amounting to £18,500 annually; that the gross earnings on an incomplete system, besides these subventions, amounted last year to £27,000, and that large receipts may be anticipated when the connection between Jamaica and Colon is completed, which will be by the end of the present year. The new issue, besides its preference, will be entitled to participate in all profits on the entire capital above 10 per cent., but may either be paid off at the end of five years at 10 per cent. premium, or the holders may convert into ordinary shares at £110 for every £100.

Since the circular was issued the new preference stock has been successfully placed in London, and there is now every prospect of the system of cables connecting the West India islands and Panama with those in the United States being completed, and the fact that Mr. Cyrus Field has joined the board is regarded with favor.

DIRECT UNITED STATES CABLE.

The statutory meeting of this company was held on Wednesday, July 9th, at the Cannon Street Hotel, London; Mr. E. H. Lushington in the chair.

The chairman said the meeting was formal, the object being to appoint an auditor. The Company was constituted in March last, and, unfortunately for them, at that time the great cry was coalition. It was determined by various companies that a large amalgamated company should convey messages from this country to the United States, and that everybody should be subject to their laws and regulation. He was happy to say, however, that this company succeeded in raising the necessary funds, and the directors had now completed the preliminary arrangements with Messrs. Siemens & Company, who were collecting materials for the purpose of constructing the cable, and who were prepared to do all to ensure its safe laying that modern science would allow them to do. They had determined to build a vessel for the purpose, and altogether the directors believed that, in placing the contract in the hands of these gentlemen, they had consulted the best interest of the shareholders. In conclusion, he stated that the directors were determined to act by themselves, and not to enter into any amalgamation whatever.—*The Railway News.*

THE report of the directors of the Eastern Telegraph Company recommends a dividend of 5*s.* per share, making, with the three previous payments, a total dividend for the year at the rate of 7 per cent., and states that they have carried to the reserve fund £42,958, thus raising it to £82,844.

THE telegraph line from Heligoland to Hamburg, constructed by the United German Telegraph Company of Berlin, was opened one day last week for use, by the despatch of a message from Lieutenant-Colonel Maxse, Governor of Heligoland, to the directors of the company.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
August 15, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Messages may be taken for Brandy Wine Springs and Stanton, Del. They will be delivered from Newport, Del. Charges for delivery, 50 cents.

Carr, Ill., changed to Bluff Hall, Ill.

Plank Road, Ill., closed.

Manteno, Ill., re-opened.

Syracuse, Ks., closed.

Messages may be taken for Swampscott, Mass., and Clifton House, in Swampscott, to be delivered from Lynn, Mass. Delivery charges, 75 cents for former, and $1.25 for latter.

Big Rapids, Mich., is now a W. U. office; square 250; check direct.

The office at Otsego, Mich., square 260, is in Allegan Co.

Luray, Mo., closed.

Table Rock, Neb., now in square 502, will hereafter be square 465.

Cape May, C. H., N. J., closed.

Business for Dun Ellen, N. J., will hereafter be checked direct.

Five Mile Point, Otsego Lake, N. Y., re-opened, square 57.

Little Mountain, O., re-opened.

Douglassville, Penn., closed.

White Horse, N. J. changed to Kirkwood.

Logan Iron Works, Pa., is in Mifflin Co. and not Juniata Co., as published in tariff book.

Ralston, Pa., is now a W. U. office, square 93. Check direct.

The office published in JOURNAL of April 15, 1873, as Clifton, Pa., should read Clinton, Lawrence Co., Pa.

NEW OFFICES.

* Fenwick, Conn.,	30	3	32	Hartford, Conn.	
* Fenwick Hall, Conn.,	30	3	32	"	
378 Bluff Hall, Ill.					
318 Milton, "					
307 Montrose, "					
376 Walker, Iowa.					
21 Newtonville, Mass.					
269 Fremont, Mich.					
269 Holton, "					
269 Morgans, "					
100 Otsego Lake, Otsego Co., Mich.					
269 Twin Lake, "					
* Glencoe, Minn.,	125	8	307	Chicago, Ill.	
* Hopkins, "	100	7	307	"	"
* New Ulm, "	125	8	307	"	"
* Oneota, "	150	10	307	"	"
* Waverly, "	125	8	307	"	"
* Young America, Minn.,	125	8	307	"	"
331 Guntown, Miss.					
27 Fabyan House, N. H. Tariff same as Crawford House, N. H. Check Crawford House.					
47 Kirkwood, N. J.					
* Furnaceville, N. Y.,	25	2	74	Oswego, N. Y.	
84 Donaldson, Pa.					
140 Summit City, Butler Co., Pa.					
488 Englewood, Texas.					
* Brooklyn, Texas,	75	5	470	Marshall, Texas.	
* Hawkins, "	50	3	470	"	
* Mineola, "	50	3	470	"	
* Terrils, "	65	4	470	"	
* Wellspoint, "	65	4	470	"	

It is found that quite a number of offices use square rate for tariff to points to which the State Rates should apply. THE STATE RATES, AS PER INSTRUCTIONS, "SHOULD BE USED WITHOUT REFERENCE TO SQUARE RATES," WHETHER THE STATE RATES ARE LOWER OR HIGHER THAN THE SQUARE RATES.

Offices having "Special Sheet A," will check Donaldson, Pa., 25 cents more than "special rate" to Philadelphia. The square rate not to be increased.

CUBA CABLE BUSINESS.

The Cable between Jamaica and Porto Rico, has been repaired, and telegraphic communication is now complete as far as Trinidad.

The Cable between Trinidad and Demerara, in the West Indies, is broken, and messages for Demerara and Berbice, are now delivered from Trinidad by steamers on 6th and 21st of each month.

The following rates via. Cuba Cable, will apply hereafter, and should be used in connection with the "RULES" for Cuba Cable business, published in "Supplement No. 3," "Journal" of July 15th, 1873:

Tariff, in Gold.

NOTE.—In addition to the following rates to Havana, there is a Spanish Government tax of 40 cents for 10 words and 40 cents for each additional 10 or fraction of 10 words.	For Ten Words.	For each Additional Word.
To or from Havana, Cuba, and any office of the Western Union Telegraph Company, in the United States, east of the Mississippi River, including St. Louis, Mo.	$5 00	$0 40
To or from any office of the Western Union Telegraph Company, west of the Mississippi River, except St. Louis, Mo.	6 00	0 50
To or from Offices in New Brunswick and Nova Scotia.	6 00	0 50

Official Messages of the Spanish and United States Governments will be charged less than the above rates by $1.75 per each message of ten words or less, and eighteen (18) cents for each additional word. All such messages must be signed officially and the prefix "G" must precede the check.

On messages to the following named offices in Cuba, beyond Havana, collect, in addition to the foregoing rates, the Spanish local tariff, viz: Forty (40) cents, gold, for ten words or less, and forty (40) cents, gold, for each additional ten words or fraction of ten words.

The government tax does not apply on messages to these points:

Batabono,	Los Palacios,
Bajucal,	Los Punas,
Bemba,	La Mulata,
Bocu Du Sagua,	Matanzas,
Bayamo,	Mariel,
Bahia Honda,	Pinar Del Roi,
Consolacion Del Sur,	Paso Real,
Colon,	Puerte Principe,
Cardenas,	Remedios,
Cienfuegos,	San Antonio,
Caibarien,	Santo Domingo (Coloniado),
Cabanas,	Sagua,
Ciego De Avila,	Santo Spiritu,
Cuba,	San Diego De Nunez,
Guanaja,	Trinidad,
Guarinaro,	Union De Reyes,
Guines,	Villaclara,
Jignani.	

	From United States, East of Mississippi River, including St. Louis. GOLD.		*From United States, West of Miss. River, excluding St. Louis; and from New Brunswick and Nova Scotia.* GOLD.	
	1st ten words.	*Each Add'l word.*	*Ten words.*	*Each Add'l word.*
Santiago	$6 25	$ 53	$7 25	$ 63
Kingston	7 75	68	8 75	78
Porto Rico	11 50	1 06	12 50	1 16
St. Thomas	11 88	1 09	12 88	1 19
St. Kitts	12 75	1 18	13 75	1 28
Antigua	13 00	1 21	14 00	1 31
Guadaloupe	13 38	1 24	14 38	1 34
Dominica	13 75	1 28	14 75	1 38
Martinique	14 00	1 31	15 00	1 41
St. Lucia	14 25	1 33	15 25	1 43
St. Vincent	14 50	1 36	15 50	1 46
Grenada	15 00	1 41	16 00	1 51
Barbadoes	15 13	1 42	16 13	1 52
Trinidad	15 50	1 46	16 50	1 56
Demerara	17 50	1 66	18 50	1 76
Berbice	17 50	1 66	18 50	1 76

Messages to Panama, Valparaiso, and all points in South America can be mailed at Kingston, Jamaica, at above rates, with twenty-five cents in addition for postage.

ATLANTIC CABLE BUSINESS.

We are notified that the Hong Kong and Shanghai Cable is repaired; messages can now be sent by telegraph direct to Shanghai. The Shanghai and Nagasaki Cable is still interrupted.

CHANGE IN RATES

To and from Points in Canada.

On and after September 1st, 1873, the rate between Western Union offices in the United States and points on other lines in Quebec, Ontario and New Brunswick, will be 30, and 2 for other lines, and as given below for Western Union lines.

Unless otherwise stated, the amounts indicate the "tariff for this line," to Ontario, Quebec and New Brunswick:

Maine, New Hampshire and Vermont	$0.45 and 3
Massachusetts (except Boston), Rhode Island and Connecticut	.60 and 4
New York (except New York City) to	
Quebec and Ontario	.45 and 3
New Brunswick	.70 and 5
New Jersey, Ohio and Pennsylvania, to	
Quebec and Ontario	.60 and 4
New Brunswick	1.00 and 7
Delaware, Maryland, District of Columbia, Virginia, Illinois (except Chicago) and Wisconsin (except Milwaukee)	1.00 and 7
Indiana, Kentucky and West Virginia,	
To *Quebec and Ontario*	.85 and 5
New Brunswick	1.00 and 7
To Michigan	.50 and 3
Iowa, Missouri, Minnesota, North Carolina and Tennessee	1.20 and 8
South Carolina	1.45 and 10
Alabama, Arkansas, Florida, Georgia, Mississippi, Kansas and Nebraska	1.70 and 11
Louisiana and Indian Territory	2.00 and 13
British Columbia, California, Colorado, Idaho, New Mexico, Montana, Nevada, Oregon, Texas, Utah, Washington Territory and Wyoming	2.50 and 17

Boston, Mass., New York City, Chicago, Ill., and Milwaukee, Wis., will be specially instructed.

MESSAGES WILL BE SENT AND CHECKED AS HERETOFORE.

WM. ORTON, President.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, August 6th, 1873.

Executive Order No. 150.

No words in messages after the signature will be transmitted free for customers. The signature embraces simply the name. Titles of every description, addresses, the word "answer," or any other words after the signature, must be counted and charged for.

WM. ORTON, President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, August 7th, 1873.

TO TRANSFER AGENTS:

Hereafter, the titles, "Manager" and "Transfer Agent," or T. A., will not be added to transfer messages. Transfer agents and managers being well known, there is no necessity for using such titles, and no propriety in charging the customers for them.

On and after August 18th, Middletown, Pa., will be added to the list of money order offices in D. H. Bates' district, and Catawissa, Pa., in same district, will be closed as a money order office.

On and after August 18th, Washington, Pa., will be added to the list of money order offices in C. O. Rowe's district.

Cimarron, N. M., and Los Vegas, N. M., in W. B. Hibbard's district, have been closed as money order offices.

GEO. H. MUMFORD, Vice-President.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, AUGUST 15, 1873.

In the JOURNAL of June 16th we announced that anything and everything, although not to be found as words in Webster's Dictionary, had been incorporated, by custom, into the language, and are each counted as one word. This statement should be considered as applicable to domestic messages only, as anything and everything are each counted as two words over the lines of the Cable Companies.

We recently called attention to what seemed to be an inexcusable use of the right to send office messages, based upon a communication from New Orleans. We now present, in another column, an explanation of the circumstances under which the message was sent, which materially changes the aspect of the case. Unexplained, the message was open to criticism, but, as explained, it shows a commendable exercise of discretion on the part of the sender, which it would be well for the service if all the Company's employés would pattern after.

PUTTING POSTAL CARDS IN SEALED ENVELOPES.

It is curious to note the great care and ingenuity which some people display in wrongly doing a very simple duty. Recently, we had an illustration of this kind, which was rather amusing. A well-meaning and painstaking person, who was evidently actuated by a laudable desire to utilize the new postal cards, wrote a communication upon one of them, and then cautiously placed it in an envelope, carefully attached a three cent postage stamp, and mailed it to St. Johns, N. B. Up to this point the whole transaction had been prudent, if not entirely in accordance with the more usual practice, but, in affixing that three cent postage stamp, the bounds of prudence were overstepped, and the penalty was exacted from the receiver of the letter in the shape of a ten cent. charge for insufficient prepayment of postage. Now, if the communication had been written upon ordinary paper, the postage, if prepaid, would have been six cents. If the postal card had not been placed in the sealed envelope, it would have required only an additional one cent stamp for the Canadian postage. Thus, a want of knowledge and of judgment entailed an unnecessary expense of twelve cents on the postage of a single postal card.

MISAPPROPRIATION OF SAVING BANK FUNDS FOR POSTAL TELEGRAPHS.

The matter of the misappropriation of the funds of the Post Office Savings Banks by the Telegraph Department, which has attracted so much attention in England during the past six months, was fully discussed in the House of Commons on the 30th ultimo, and resulted in the presentation of a resolution of censure, which was amended by the substitution of regret for the act, and adopted. The case is briefly this: In 1869 Parliament granted seven millions of pounds sterling for the purchase and extention of the Telegraphs, but when this sum was expended, Mr. Scudamore, the head of the Telegraph Department, and Secretary of the Post Office, did not stop his extensions until Parliament had made another appropriation, but used the funds belonging to the Savings Banks and Money Order business to the amount of over half a million pounds for carrying on the work. In 1871 another grant of one million pounds for the Telegraph was made by Parliament, but as three-fifths of this sum was for liabilities and over expenditure already incurred, the balance was soon expended, and Mr. Scudamore again repeated his former operation of appropriating other funds without authority,—the Post Office having uncontrolled power of dealing with balances to the extent of a million pounds in excess of its legitimate requirements. It appears that the unauthorized advances thus made for the operation of the telegraph since the last appropriation have amounted to £890,000, of which the greater part was expended within the financial years—1872-'73. This vast sum of money was mainly derived from three sources, viz:—Money Order business, Post Office Savings Banks, and Post Office receipts proper. There is no pretence that Mr. Scudamore made a bad use of the money. Everybody admits that he used it for the good of the service, and that if he had not assumed the responsibility of taking the funds and applying them as he did, the telegraphs would have failed of meeting the wants of the public. The difficulty, however, is that he took them without authority, and technically without the knowledge of his superiors, although they must have known, or ought to have known, that he was expending upon the telegraph annually much more money than he was receiving.

When the resolution of censure was pending in Parliament Mr. Gladstone said "the conduct of Mr. Scudamore may be a very proper subject for animadversion, but he is no fit subject for the censure of this House. Mr. Scudamore has committed a great error, but that error is followed by still greater services, and upon the merits of this case I refuse to censure him."

The truth is that the Government knew very well hat Mr. Scudamore was spending a great deal more money than had been authorized by Parliament, and the question whether the Treasury knew where he got the money or not is of no particular consequence. He had asked them for more money, and they had replied that it would not be granted until he had made out a full detailed account of capital expenditure.

Now, full and detailed accounts are sometimes annoying and troublesome documents, and when they would show an enormous increase of expenditure beyond all previous estimates, the disinclination to produce them is quite natural.

The British Telegraphs are well managed, and perform the service to the satisfaction of the public. Mr. Scudamore is an intelligent, hard-working and competent Manager, and deserves great credit for the energy which he has displayed in providing so satisfactorily for the public wants. But the cost of running the British Telegraphs is no small item, and when the capital account is once closed and the extensions, reconstructions, maintenance and repairs are charged to working expenses, we are afraid that the annual budget will have to provide for a large deficit in the revenue, or the future facilities will be found to be inadequate to the demand of the public.

Already the capital expenditure amounts to £8,890,000, and there are unsettled claims amounting to over £4,000,000 more, which when paid will swell the cost of the plant to an amount far beyond the original expectations of the Government.

It is scarcely probable that when the capital account is closed that the British Telegraphs will have cost the Government less than $70,000,000.

TESTS OF INSULATORS.

The following tests of insulators were recently made on the lines between Cincinnati and Dayton, Ohio, August 1, 1873. Heavy rain for 15 minutes, extending from Cincinnati to Dayton.

Mileage resistance in ohms.:

Glass	1.830.000
Brooks	2.344.800
Kenosha	3.180.800

July 26, 1873. Raining during whole preceding night. Had ceased at 8 A. M., when test was made:

Glass	3.172.000
Brooks	3.660.000
Kenosha	7.056.000

The above tests show great comparative superiority of the Kenosha over the other forms of insulators in use.

The following test shows the insulating power of the Kenosha pattern during a prolonged rain:

July 19, 1873, the line between Pittsburgh and Crestline (Kenosha insulation) was tested, after 19 hours' rain, and found to have a mileage resistance of 2.250.000 ohms.

There is a little boy, nine years of age, in Shelbyville, Ky., who is described by an enthusiastic correspondent as the champion operator of the United States for his age. We hope he is not compelled to work in the office at his tender years, but is early sent to school during the day and to bed at night. By and by his services will be needed, but not surely until he gets into his teens. Let us spare the infants.

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[From *The Telegraphic Journal.*]

MATHEMATICS FOR NON-MATHEMATICIANS.

By William Paget Higgs, LL.D.

Introductory.

Numerous attempts have been made to interest the general reader in the science of mathematics. Some of these attempts have succeeded and others have failed. A careful study of the cause of failure leads to the observation of a striking similarity in the unsuccessful attempt—and this similarity consists in dealing to excess with abstract ideas. Mathematics is a tool invaluable when applied to the shaping of some end, but it is possible, even upon sharpening, grinding, or adjusting a tool, to waste time. Indeed, in the cutting of rough wood an edge may be too keen. So it is with mathematics, and the reader feels that he is constantly at the grindstone. He may admit that by pre-eminence mathematics is the science of abstraction, but experience has taught him that the greatest good has arisen from its application to concrete methods.

Nor would it be difficult to prove that mathematicians, by an excessive devotion to the science in its purity (the proper term for its fullest abstraction), have rendered it unpopular. In its transcendental dress the student approaches mathematics with awe, and if bold enough to question, receives its teachings, as Professor Airy has aptly said, "rather with the doubts of imperfect faith than with the confidence of rational conviction." In his "Principles of the Differential Calculus" Mr. Woolhouse observes, with only too much reason, how "it is to be regretted that most of our academical treatises on this as well as other subjects abound so much with complex algrebraic processes, without the slightest traces of logical reasoning to exercise and improve the intellect. We should bear in mind that the simple execution of analytical operations, acquired by dint of practice and experience, is a mere common species of labor, often merely mechanical, whilst a distinct apprehension of the specific object and meaning of the operations, and a contemplation of the clearness and beauty of the various arguments employed, constitute the intellectual lore that gratifies and enriches the mind, and stimulates its energies with an ardor after the investigation of truth."

But it is time we mapped out the chart intended to be followed in these pages. For our purpose we may consider mathematics, under an arbitrary division, into the solution of problems (*a*), in which it is required to ascertain the value of unknown (from the relation which they bear to known) and constant quantities; and (*b*) to the investigation of variable quantities, increasing or decreasing uniformly with regard to other quantities that are constant. When dealing with *a* we are in the dominion of ordinary *algebra;* the consideration of *b* is effected by means of the differential and the integral calculus. From the symbols and signs of operation of ordinary algebra, with the simpler applications of algebra to geometry, and the necessary investigation of the elements of trigonometrical science, we may therefore pass at once to the principles of the calculus, and place the student as early as possible in a position to understand its applications. Subsequently we may proceed to a mutual study of the doctrine of Quaternions.

The scheme is bold, perhaps too bold. Unless we had profited by the labors of many living mathematicians, and of many who had passed away, it would have been impossible. We lay no claim to originality. On the contrary, aid has been freely taken from every source. The absence of originality is no loss to the student—he is a gainer by the weight of the authorities consulted.

Finally, I have not attempted technicality in language, except where the technical term is self-explanatory; but I have preferred a familiar style, both in language and illustration. In any instance where I may fail to express clearly my meaning, I shall be glad, through the columns of the Journal, to give fuller explanations.

Division I.—The Algebra of Constant Quantities.

Symbols and Signs of Operation.

In arithmetic we have learnt to consider two kinds of numbers, *abstract* and *concrete*. 1, 2, 3 or 4, etc., is an abstract number, because it denotes an abstract idea of how many times; but 1 apple, 2 apples, or 3 apples, etc., is a concrete number, because it denotes so many actual substances. We cannot see or feel 2 as a number until it is embodied in the form of 2 apples.

In algebra, however, the division into concrete and abstract need not be a source of trouble, for we may substitute a *letter* (a, b, c . . . x, y, z) for either an abstract or concrete number. Thus a may be put to represent 1 or 1 apple, or 2 or 2 apples. If a be taken as a kind of short way of writing one apple, $2a$ will stand for two apples; but if a is taken to represent two apples, then $2a$ will stand for four apples, and so on. Similarly, if a be taken to represent the figure 1, then $2a$ will be equal to 2. If a stand for 2, then $2a$ will equal 4.

This is enough, perhaps, to enable the student to understand the definition:—*Algebra is the Science of Computation by Symbols.*

The symbols generally employed are letters of the alphabet, sometimes those of the Greek alphabet. There is no reason why any system of symbols, however arbitrary, should not have been used; but universal custom has given the preference to letters, arbitrary symbols being employed when the number of things or of abstract ideas to be represented exceeds the number of letters.

It will be convenient to remark that there is in common use in algebra a sign for equality, or the words *equal to;* it is=. If we wish to express that one and one make or equal to two, we can write 1 and 1—.

That also there is a sign for addition, called *plus.* and it is + So that we can state shortly 1 added to 1—1, or 1 + 1—2. Again there are signs for subtraction, multiplication and division, to which we must presently refer.

There is some difference between the operations of arithmetic and those of algebra. Instance may be taken in adding 2 and 3. Arithmetically 2 + 3—5; but if we place a for 2 and b for 3, we can only give the result in algebra as $a + b$, unless we previously arrange that c shall equal 5. In the last case we can say $a + b = c$, one of the simplest forms of an algebraic equation. Let us quite understand this. If we have a basket of fruit containing apples (call them a), and blackberries (call them b), we cannot say apples + blackberries equal pears, we can only give the result as fruit, which is a general and not a particular term. Consequently we must be satisfied with the statement of the contents of the basket (if we wish to describe particularly) as being apples and blackberries. Similarly, in algebra, we often cannot describe a more definite result than $a + b$. What does this negative evidence teach? It shows that the sign + is a sign indicating that the action of addition is to be performed—is, in fact, a sign of operation. So are all the signs in algebra; they indicate *what is to be done* when we have found the values of the symbols of letters which they connect. A complete formula, indeed, is nothing more than a symbolic direction to perform certain actions, to attend a desired result, which result may or may not be expressed.

The Equation and the Unknown Quantity.

We have shown how the addition of 3 to 2 and the sum obtained may be shortly written, viz., 3+2—5. This (again taking a for 2, b for 3, and c for 5), it has also been shown, may be represented algebraically as

$$a+b=c.$$

From the *sign of equality* (—) connecting the two members, all similar equal quantities so connected are classed under the general term of an *equation.* The *solution of an equation* or the *solving* of an equation, merely means the working of it out until the *answer* has been found. The *answer* is the *unknown quantity.* The unknown quantity is generally represented by the letter x, or, if there are more than one, by the letters x, y or z (known quantities, as we have said, being represented by the letters a, b, c, &c.)

Substituting, therefore, the letter x for the letter c in the foregoing equation, we have

$$a+b=x \text{ (for the answer).}$$

As we have determined that a shall equal 2, and b shall equal 3, x or the unknown quantity, or answer, must equal 5. Thus we have, as synonymous terms,

$$a+b=x,$$
$$\text{or } 2+3=5.$$

Now we may so ring the changes on the two members of the equation as to form *new* equation. We say *new*, because for *two equations to be equal* (*or to be equated*) *their results* (*or their x's*) *must be equal.*

To test this let us add 2 to *both* sides of the equation. We have

$$1+3+2=5+2, \text{ or } 7.$$

Evidently a new equation, because 5, the former result (or x) does not equal 7. Similarly, if we multiply both sides by 2, or divide them by two, or take two from them, we shall obtain new equations. We learn, then, that the balance of an equation is not destroyed when we treat in any way *both* sides by the same quantity. This is the characteristic of an equation, and from this characteristic there springs a valuable aid to the solution (or finding the answer) to equations.

Let us try to understand its application.

There is a sign employed in Algebra (and sometimes in arithmetic) indicating *subtraction* or *taking from.* The sign is called *minus*, and is —. So that we may state the equation, 3—2=1, or $b=a-x$. Suppose we are told (adhering to our former values for a and b) that

$$a=x-b,$$

and that we are to find the numerical value of x. How should we set about doing it?

Evidently we should say, substituting figures, that

$$2=5-3,$$

or, what is the same thing, 5—3—2. But we wish to know what x is equal to, and to know this it is evident that all we have to do is follow our direction, implied in the equation, to take 3, or b, from the right side of the equation and add to it the left, and so get back our old form—

$$a+b=c, \text{ or } 2+3=5.$$

Or we may proceed in another way, which is, mathematically, the more accurate. We may add 3, or b, to both sides of the equation, thus:

$$a+b=x-b+b,$$
$$\text{or } 2+3=5-3+3,$$

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and, as subtracting 3 and adding 3 result in nothing, we have again $a+b=x$. This operation of taking from one side of an equation to add to the other, or *vice versa*, the equality being preserved, is termed *transposition*.

We ask our students to set to work and repeat this process for themselves with other numbers. They will derive much greater benefit from such practice than they would from puzzling their brains over the unpractical work even now often given in our text-books. I will make clear what I mean by quoting my lamented friend and former master, Professor De Morgan, who had a vast dislike to the then too common method of illustrating the teaching of algebra by examples of useless equations. "In answer," he says "to a defence sometimes set up, that the system is *practical*, we observe that much of what is done has no reference to any practical end whatever. The great body of the algebraical work of a school consists in questions of multiplication and division which never occur in practice; above all, in the solution of certain *conundrums*, called *problems*, producing equations, of the *practical* nature of which the reader shall judge from the following specimens:

"'A person being asked the hour, answered that it was between five and six, and the hour and minute hands were together. What was the time?'

"'A post is ¼ in the mud, ½ in the water, and 10 feet above the water; what is the whole length?'

"'A person has two horses and a saddle worth £50: now, if the saddle be put on the back of the first horse it will make his value double that of the second, but if it be put on the back of the second it will make his value triple that of the first; what is the value of each horse?'

"Now, if all this be meant for improvement in theory, no one will deny that the reasons of all the rules should be previously understood; but if they be practical questions, we need only say that people have more pertinent methods of answering the question 'What's o'clock?'—that no one concerns himself about the proportion in which a post is shared between wind, water and mud—and that the Newmarket gentry have a better way of determining the value of their horses than by involving them, saddles and all, in a simple equation."

Far be it, however, that we should condemn the general system of teaching; we wish to encourage the disheartened student, who may have succumbed not for want of energy but its waste.

Next we shall have to deal with *negative* quantities, or those quantities erroneously valued as "less than nothing."

Positive and Negative Quantities.

Hitherto we have been dealing with *positive* quantities—that is, with those quantities which are arrived at by counting upwards from zero or 0. But let us imagine ourselves counting *downwards* from zero or 0, and we arrive at so many less than nothing. "Less than nothing," however, as I shall presently endeavor to show, is an incorrect expression. It is convenient to call those quantities above 0 *positive*, and those below 0 *negative*. Positive quantities may or may not have the positive sign (+) prefixed to them, but negative quantities have always the negative or minus sign (—) prefixed. $+a$ is a positive quantity; $-a$ is a negative quantity.

In order to perfectly understand the distinction between positive and negative quantities, we may consider two illustrations:

I have a thermometer, and I plunge it into warm water. The instrument indicates say 20° of heat, and this may be written +20°. Or I plunge the hermometer into a freezing mixture, and the mercury sinks below zero, say 20°; this may be written —20°. 20° of heat is then written +20°, and 20° of cold is written —20°. Now, 20° of cold is not 20° "less than nothing;" indeed, it is a *positive want* of 20° of heat to bring about the normal or zero condition.

The second example will be still more familiar: I *have* three apples, and I may write this as +3 or +3*a*; I *want* three apples, and I may write this as —3, or —3*a*. In the latter case it will take three apples to satisfy my want, and another three apples to make me rich in the amount of three apples.

Thus, —3*a* does not mean three apples "less than nothing," which would be an absurdity, but it means a *want* of three apples to restore my appetite for fruit to its normal state, or state of no desire.

The expression or equation, it will be seen, holds good that—

$$-3a+6a=+3a,$$

for if we take 6*a* as being composed of two 3*a*'s, it will absorb one 3*a* to satisfy the want expressed by the negative or minus sign, and we shall have one 3*a* remaining.

If the reader has mastered the distinction between positive and negative quantities, he has passed the *pons asinorum* of algebra. If he be in possession of the correct meaning, he will understand that the distinction consists in measuring in two different directions—that is, if by + he is told to measure to the right, by — he knows he is to measure to the left. The signs indicate opposition—to add to, and to take from—the possession, and the want of.

That the reader may be assured of his comprehension, let him resolve for himself the following equations:

$$-20+10=-10,$$
$$10-30=-10.$$
$$-2p+6p-4p=0,$$
$$-4p+6p-2p=0,$$
$$6p-2p-4p=0.$$

The last expression leads to the consideration of the mathematical use of *brackets*. Brackets in mathematics are similar in form to the brackets ( ) [ ] of print or of writing, but they do not, as those in print, indicate inferiority or illustration. Mathematically they are signs indicating *collection*. Thus, in the expression

$$6p-2p-4p=0,$$

the repetition of subtraction, indicated by $-2p-4p$ would be equally well represented by $-(2p+4p)$, or by adding the two negative quantities and taking their sum from 6*p*, with the result —0. Brackets are employed to class or collect together several *simple* quantities, which may be taken together as one *compound* quantity. Instead of brackets the *vinculum*, a line drawn above the compound quantity, is sometimes used. Thus the following are identical expressions:

Brackets.	Vinculum.
$6p-(2p+4p=0.$	$6p-2p+4p=0.$

Brackets sometimes occur within brackets, and then the following arrangement is most general:

$$12p-[6p+(2p+4p)]=0.$$

Though simple the reasoning we have followed, the rule for subtraction may be stated even more simply. *Change the signs of all the quantities to be subtracted, and then add.*

Let us test this numerically:

By subtracting a positive number from a positive number, as 4—2=2, and 4+(—2)=2, or rendering a positive number less positive, for in the latter case it takes 2 of the positive number 4 to satisfy the want expressed by the negative sign prefixed to the 2.

By subtracting a negative number from a positive number, as 4—(—2)=6, which is simply a direction to perform the operation of subtracting or removing the *want* of 2—expressed by (—2)—from the 4. We may consider this as a direction to increase a positive number, the direction being written under a negative form.

By subtracting a negative number from another negative number, as —4—(—2)= —2, or, in other words, removing the want expressed by the negative quantity (—2).

By subtracting a positive number from a negative number, as —4—2= —6, or rendering a negative quantity still more negative.

Let us regard the question, which is one of great difficulty, in another light. We know that 4 may be written 4+2—2; for as 2—2 equal nothing, the addition of 0 to 4 does not alter its value. Let us consider subtraction as meaning "taking away," and, starting with 4+2—2=4, let us see the effect of "taking away" first the +2 and then the —2, which is simply a repitition of the examples given above in subtracting a positive or a negative number from a positive number, thus:

Subtraction from a positive number.

4	+2	—2	=4
4	*	—2	=2
4	+2	†	=6

Similarly we may illustrate the two examples remaining, by considering —4 as written —4+2—2, where, as before, 2—2 is nothing.

Subtraction from a negative number.

—4	+2	—2	= —4
—4	+2	†	= —2
—4	*	—2	= —6

* Taking away the positive number.
† Taking away the negative number.

Thus we can perceive the reason for the following *rules for brackets:*

If the sign + be before the brackets the brackets may be removed without altering the value of the expression.

If the sign — be before the brackets, remove this sign with the brackets, and change all the signs of the quantities within the brackets.

BASTET'S BATTERY.

This battery consists of a compound of cupric salt, preferably the sulphate, and of the nitrate of soda or potash, in a solution of the same ingredients in sulphuric acid, to form a liquid compound, and in the employment of nitro-hyposulphate of sodium or potash.

DIAMONDS IN THE ELECTRIC LIGHT.—At the conclusion of Prof. Tyndall's third lecture on "Light," on Thursday, at the Royal Institution, a gorgeous spectacle, which is seldom seen, was afforded to the delighted audience. Mr. Streeter had sent a tray of diamonds, set as necklets and other ornaments, upon which were directed the powerful rays from the electric lamp. The display of color by refraction was superb, while the specks of light reflected from the facets upon the walls conveyed the impression of a star-light night. The brilliancy of well-cut diamonds could hardly have received better illustration.

ACTION OF THE ELECTRIC FLUID ON FLAMES, LIQUIDS AND POWDERY SUBSTANCES.—*Second Note by M. Neyreneuf.*—The writer examined flames containing no solid particles. In pure hydrogen there was a sensible attraction by a negative point; in carbonic oxide and sulphide of carbon the

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attraction was more marked, and to both points. Alcohol behaves like ordinary gas. Retreat of the flame is most marked with essence of terebenthin (burnt in a lamp). If the electric point be directed normally to the surface of liquids in a conducting cylindrical capsule, an umbilicus is produced for both fluids in water, oil, sulphide of carbon, essence of terebenthin. With badly conducting liquids, if one withdraws the point after having immersed it some millimetres, a liquid cone remains adherent as long as the electricity passes. Few powders give distinct effects. The blue sand used for drying with is best. Either electric point held a little way off produces centrifugal effects, while if the negative point be held very near, there is a centrifugal aspiration. On contact one may, as with liquids, raise and maintain a cone of grains during the passage of the current.

ELONGATION BY MAGNETIZATION.—Prof. Mayer has announced some instructive conclusions from a series of experiments upon magnetism. These experiments were made with a view to investigate the change of dimensions suffered by bars of steel or iron by magnetization. Faraday was the first to discover this temporary elongation of an iron bar when magnetized by passing an electric current around the same, while Prof. Henry, of the Smithsonian Institute, Washington, verified these experiments some ten years ago by means of an apparatus of extreme delicacy. The apparatus employed by Prof. Mayer if also very delicate, and capable of measuring a variation in length of one two-hundred-thousanths of an inch. The bars of iron which suffered an elongation when they were magnetized by passing a current of electricity around them, shortened somewhat when the current was interrupted, but never quite regained their original length. With annealed steel bars the results were the same; but with tempered steel they were quite different. Upon passing a current around these they contracted, and on interrupting the current they contracted still further.

ELECTRO DIAPASON WITH CONTINUOUS MOTION.—M. Mercadier. The author wished to construct an apparatus capable—(1) of dividing time into very small equal fractions; (2) of doing so continuously; (3) of conveniently registering these fractions. The instrument he made is as follows:—A tuning-fork is placed upright, and a small electro-magnet is fixed on a support opposite the face of one of its branches; which, on the other side, has fixed to it an "interruptor style" of platinum wire. The other branch has also a style which registers its movement on a rotating blackened cylinder. Between the branches is a platinum plate on a separate support; and with this plate the interruptor style comes into contact when the branches approach each other. The positive rheophore of a pile is connected with the plate; the negative with the electro-magnet. If now the plate is put in contact with the interruptor style a spark appears, the current passes, the diapason begins to vibrate, and the interruptor style synchronously with it. The distance of the plate is varied till the maximum amplitude of vibration is obtained. Numerical results are cited as showing that the vibrations are synchronous, notwithstanding the intermittent action of the electro-magnet. The amplitude of the vibrations depends on the form of diapason, on the distance of the electro-magnetic poles from it, on the height at which the magnet stands, on the intensity of the current, and on the nature and length of the style. This instrument is said to work very satisfactorily.

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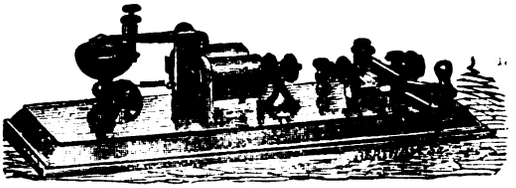
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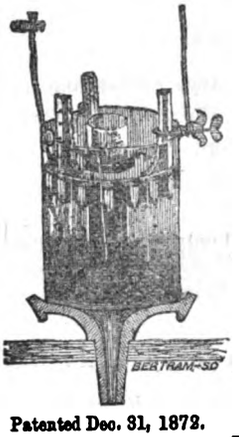
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MADE IN THREE SIZES.



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WE RECOMMEND THEM FOR

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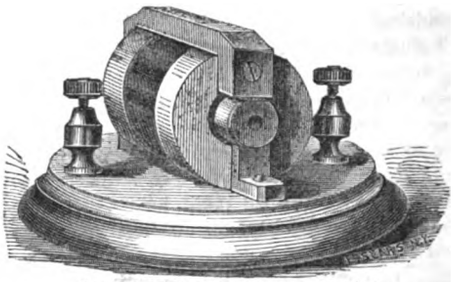
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 19. NEW YORK, SEPTEMBER 1, 1873. WHOLE NO. 140.

STEARNS'S DUPLEX TELEGRAPHS.

In a previous number of the JOURNAL we gave a description of Stearns' Duplex Telegraph, based on the differential principle. We now describe and illustrate his more recent invention, based on the principle of the bridge or balance. The differential principle consists in the arrangement of a helix composed of two wires of equal lengths and resistances, in such a manner that when a current is sent from the transmitting station it divides in equal portions, and passes through each coil of the relay at such station in opposite directions, thus producing no effect upon the armature, while the current from the distant station passes through one coil only, and thus causes a movement of the armature corresponding to the signals sent.

The bridge method consists in the combination of the receiving instrument or relay, with resistance coils in such a manner that when a current is transmitted from the home station, it passes directly to the line, without passing through the receiving instrument at that station, this instrument responding only to the currents transmitted from the distant station, which permits of the use of any kind of receiving instrument in place of the relay. The principle upon which this apparatus is constructed and operated is that of the Wheatstone bridge or balance, which invention is based upon the observed fact, that when a current is divided between two circuits, which are connected by a cross wire or bridge, no current will pass through the bridge, provided the resistances of the opposite circuits on each side of the bridge are equal, or are in the same ratio to each other.

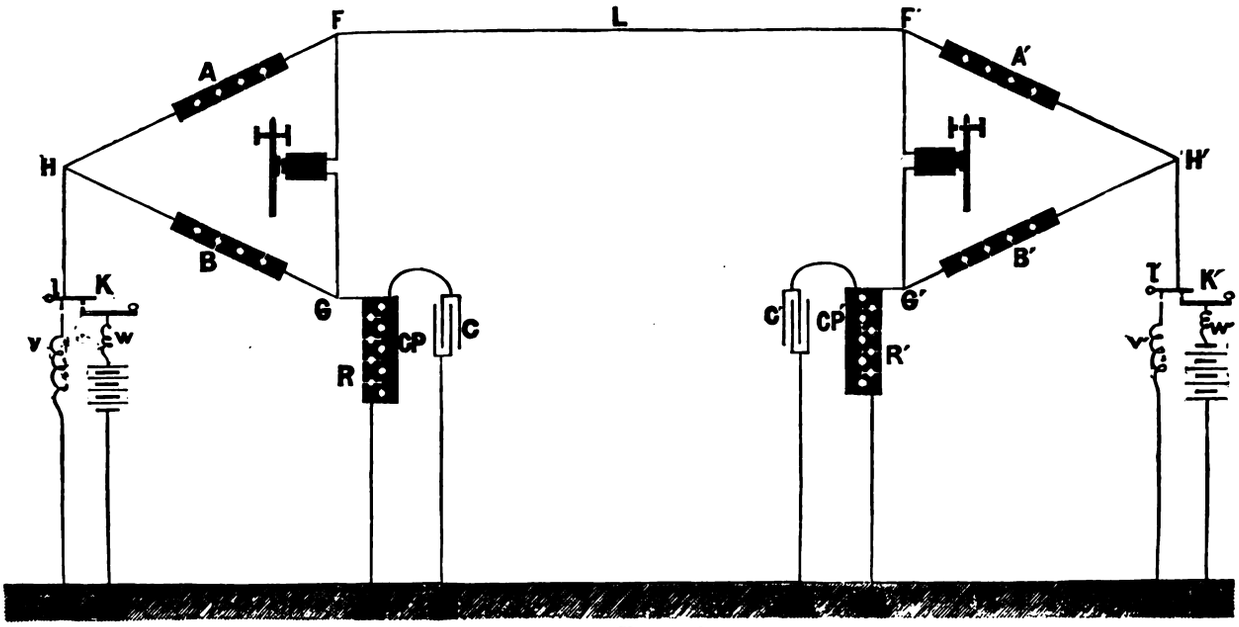


Figure 1.

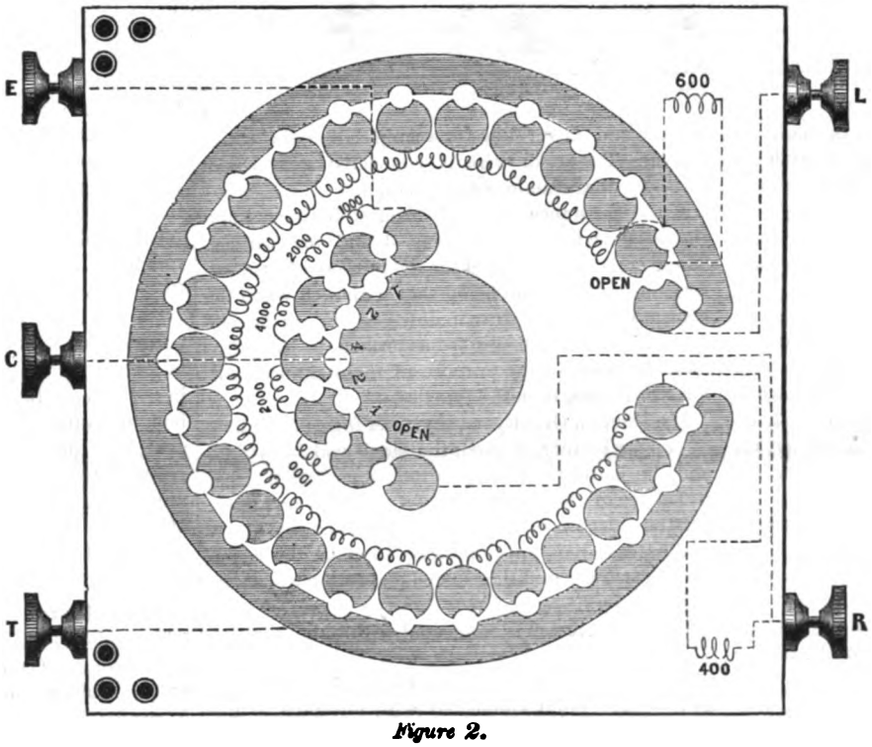


Figure 2.

Figure 1 will serve to show the principle upon which this invention is based. *H*, *A*, *B*, &c., represent the apparatus at one end of a line; and *H'*, *A'*, *B'*, &c., the apparatus at the other end. In this diagram the line *L* constitutes one side of the balance, the resistance coil, or rheostat *R*, the opposite side, while the other two sides are formed by two branch circuits, *A* and *B*. The receiving instrument is placed in the bridge between *F* and *G*. The two branch circuits unite at *H*, and are connected by a wire to the lever *l* of key *K*. When the knob of the key is depressed a current is sent along the wire to *H*, and there branches, a portion passing through the resistance coils *A* to line *L*, and a portion through resistance coils *B* and *R* to the earth.

Now, if the resistance of the circuit *A* and *L* is equal to that of *B* and *R*, no current will pass through the bridge; or, if the resistance of the branch *A* bears the same proportion to that of *L* that the resistance of *B* bears to *R*, then no current will pass through the relay.

For example, suppose the resistance of *A* to be 1,000 ohms, *L* 4,000, *B* 500, and *R* 2,000, then no current would pass through the relay at the transmitting station, because the resistances in the opposite circuits on each side of the bridge are in the same ratio to each other, that of two to one, and consequently, the receiving instrument will be unaffected by the signals transmitted from the home station. When, however, a current from the distant station is put on the line, a portion of it passes through the receiving

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instrument in the bridge, for, at the point F, it finds two paths to pursue, one through the resistance A to the lever l, and small resistance v or w and battery to the earth, and the other through the relay and coils B and R to earth.

When two or more paths are open to the passage of a current, it will divide itself between them in proportion to their several conductivities.

If the resistance of the relay is 500 ohms, the total resistance of the branch, of which it forms a part, will be $500 + \frac{500 \times 2000}{500+2000} = 900$, and the resistance of the branch $F\,A$ being 1000, the joint resistance of the two branches at F would be $\frac{900 \times 1000}{900+1000} = \frac{900,000}{1,900}$ 473 ohms, which, added to the resistance of the line, 4,000 ohms, would make the resistance of the circuit 4473 ohms. Now, if the electromotive force is 50,000 units, the strength of current at F would be 11.18 units, and this current would be divided between the two branches in proportion to their conductivities (conductivity is the reciprocal of resistance). Thus the conductivity of the branch $F\,A$ would be .0010 and that of the $F\,G\,R$ .0011, and hence 47.62 per cent. of the received current, or 5.32 units, would flow through the branch A to the ground, and 52.38 per cent, or 5.86 units, would flow through the relay to the ground. Of course the amount of current flowing through the relay can be increased or decreased by modifying the resistances in B and R.

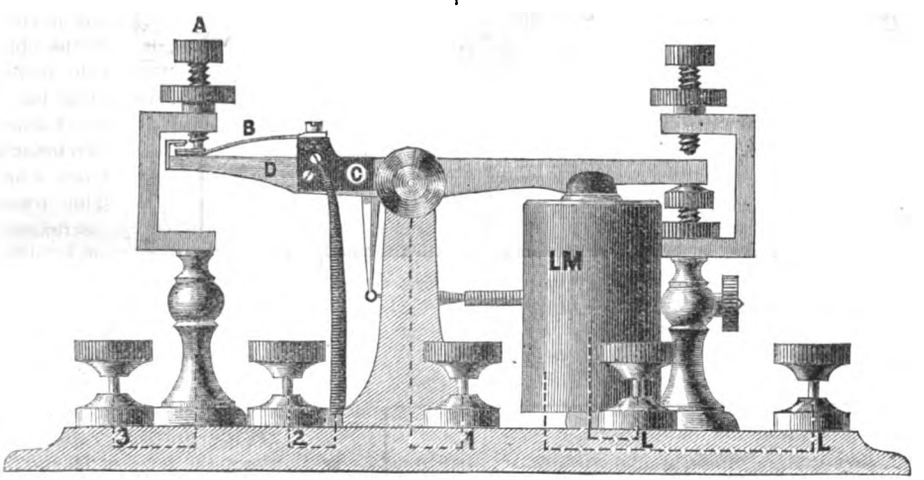


Figure 3.

Key K is so arranged that the line is always connected to the ground, either through the back contact direct, or through the front contact and battery. v and w are small resistances, placed in the circuits to prevent the battery from being put even momentarily on short circuit, and also for the purpose of maintaining a uniform resistance in the circuit when the line is connected to earth direct, or through the battery. C is a condenser, for compensating the static charge from the line, and is attached by a wire to a brass plate, $C\,P$, on the rheostat, R, which is provided with holes for plugs, for connecting it with the resistance coil plates, whereby the condenser charge can be sent through any portion of the resistance coils as desired.

Figures 2 and 3 are illustrations of the apparatus in use by the Western Union Company in the bridge plan.

Figure 2 contains the adjustable resistances, condenser plate and binding screws for connecting the apparatus. The outer circular ring corresponds to the point H in figure 1, and is attached to binding screw T, which is connected by wire with binding screw 2 in figure 3, corresponding with the lever l in figure 1. The discs in the outer circle are connected with resistance coils of 40 ohms each, terminating with resistances of 400 and 600 ohms, respectively, and corresponding with rheostats A and B in figure 1. The discs in the inner circle are attached to resistance coils of 1,000, 2,000, and 4,000 ohms each, corresponding with rheostat R in figure 1, and are connected with binding screw E, which is attached to an earth wire. The large disc in the centre is attached to binding screw C, which is connected with the condenser.

The line wire, and one side of the relay, is connected with binding screw L, and the other side of the relay with binding screw R. By inserting a plug at different points in the series of holes between the outer circle of discs and the circular ring, the two sides of the bridge, corresponding with A and B, figure 1, can be varied at pleasure; and by inserting plugs in the holes between the inner circle of discs, the third side of the bridge, corresponding with rheostat R, in figure 1, can be lengthened or shortened, as desired. By inserting a plug between the inner circle of discs and the condenser plate, any portion of the charge can be sent to line that is desired.

Figure 3 represents the transmitting sounder. L and L are binding screws, for connecting a local battery and finger key for manipulating the transmitter. The earth wire is connected with 1, and one pole of the main battery with 3.

Small resistance coils are inserted between 1 and the earth wire, and between 3 and the battery. These coils are employed for the purpose of preventing the battery from being short-circuited when the transmitting key is drawn down so as to close the front contact, and before it has broken the back contact, and also for the purpose of maintaining a uniform resistance in both branches.

If a Daniell, Gravity, or any other form of sulphate of copper battery, is used, the small coil between 3 and the battery may be omitted, since the internal resistance of the battery offers a sufficient resistance for the purpose of preventing the short-circuiting. In this case it is only necessary to make the resistance between 1 and the earth equal to the resistance of the battery.

Binding screw 2 is connected with binding screw T of figure 2.

$L\,M$ are the local magnet coils; A a set-screw and contact point connected with one pole of the main battery, whose other pole is grounded; D is a lever connected with the earth, and B is a contact point spring, insulated at Q by a piece of hard rubber, and connected as above described with binding screw T of the bridge ring terminal.

By depressing the key of the local circuit the armature is drawn down at $L\,M$, and the spring contact is completed with the contact screw A, and broken with lever D.

The operation of this portion of the apparatus is the same as that of Mr. Stearns's differential plan and need not be further described.

This system has met with great favor wherever it has been tried, and it seems likely to supersede the other form.

When the Duplex is employed in working a cable of considerable static capacity, it is desirable to modify the above condenser arrangement somewhat because the latter discharges so much quicker than the former, and it is necessary to make the discharges of the condensers and cables equal in duration as well as in quantity. If a cable returns, for example, a certain charge, say 10 *m. f.*, a condenser having a capacity of 10 *m. f.* will not produce a balance, for the reason that the condenser discharges so much more quickly than the cable. To make the discharges equal in duration as well as amount, resistance should be introduced between the condenser and the branch circuit.

The following arrangement has been found to work well upon a cable of 18 *m. f.* A resistance of 160 ohms is inserted between the first series of condensers, and the fourth side of the bridge, at the right of point G, figure 1, and a resistance of 50 ohms is inserted between the first and second series of condensers. The first series of condensers returns its charge to the relay through the resistance of 160 ohms, and the second group of condensers returns its charge through the 50 ohm coil, and also the 160 ohm coil. The charge of the second group is retarded slightly more than that of the first group. The 160 ohm coil was wound with one copper wire, but had no iron core, and it was found to retard the charge as much as 250 ohms rheostat resistance. A coil with an iron core would retard the charge much more because the charge current would have more work to do at that point, and a part of it would be converted into magnetism for a while, and afterward reconverted into electricity and continue the current at the last when it is needed. With the above combination the static balance is absolutely perfect, not the slightest quiver of the armature being observable when the circuit is opened and closed. During rainy weather, when a part of the circuit is composed of a land line, it is necessary to remove a portion of the condensers, but not the retardation coils. From the experience obtained thus far it would appear that cables can be worked with Stearns's Duplex with less trouble even than land lines of the same length.

New Electric Pile.—M. Zaliwski, the author, takes two porous cells, one of which fits very loosely in the other. Into the inner cell, containing the carbon, he pours nitric acid; into the other, sulphuric acid; and into the outside non-porous containing-vessel, fitted up with a cylinder of sheet-zinc, a saturated solution of sal-ammoniac. The arrangement of the liquids is, therefore, nitric acid, sulphuric acid, solution of sal-ammoniac.

The traffic receipts of the Eastern Extension, Australasia and China Telegraph Company (Limited), for the five months ending 31st May, 1873, amounted to £86,605, and the month of June to £18,640. The Australian line was opened for traffic in October, 1872. After October next the total receipts for the corresponding period of last year of the three companies recently amalgamated will be published, with the current receipts of the Eastern Extension Company.

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ELECTRIC POTENTIAL.

By Fleming Jenkin.

The word potential, introduced by Green, has only lately been generally adopted by electricians, and is still often misunderstood; it expresses a very simple idea, and one quite distinct from the meaning of any other term relating to electricity.

Difference of potential is that difference of electrical condition which determines the direction of the transfer of electricity from one point to another; but electricity cannot be so transferred without doing work, or requiring work to be done; hence the following definition:

Difference of potential is a difference of electrical condition, in virtue of which work is done by positive electricity, in moving from the point at a higher potential to that at a lower potential, and it is measured by the amount of work done by the unit quantity of positive electricity when thus transferred.

The idea of potential essentially involves a relative condition of two points, so that no one point or body can be said simply to have an absolute potential but for the sake of brevity.

The potential of a body or point is used to denote the difference between the potential of the body or point and the potential of the earth.

These definitions require considerable illustration before they can be fully understood.

Electrified bodies repel and attract one another, and, by a slight extension of language, we say that a quantity of positive electricity attracts a quantity of negative, but repels a quantity of positive electricity. If, therefore, we move a quantity of positive electricity towards another similar quantity, we meet with a resistance capable of measurement, equal, for example, to the weight of so many grains. In overcoming this resistance, work must be done, precisely as work must be done to lift a pound or a grain. The work done in moving a body from A to B is measured by the product of the distance multiplied into the force overcome; if the weight of a grain be the unit of force, and the foot the unit of distance, the unit of work will be the foot grain. If, then, in moving a certain quantity of electricity from A to B, we overcome a resistance of ten grains through a space of five feet, we do work equal to fifty foot grains during the operation. On the other hand, the repulsion or attraction of electrified bodies tends to perform work, for the body just brought to B may be driven back to A by the force of electricity alone. In the one case work is said to be done *upon* the electrified body in consequence of its electrification; in the other case, it is done *by* the electrified body in virtue of its electrification; less accurately, we might say the work was done by the electricity, or performed upon the electricity; the measure of the work is the same in the two cases, which are analagous to letting a body fall from the level A to the level B, and raising it up again from B to A.

An electrified body, moving from one point to another, may at one time require work done upon it in order to overcome the resistance; at another part of the journey it may pull in the direction it is going, and then work is done by it. I speak here only of the work done or required in consequence of the electrical condition of the body.

The whole work which has been required, in consequence of electrical attractions or repulsions, to move it from any point A to any point B, will be the algebraic sum of the work done by and done upon the electrified body, the first being called positive and the second negative work.

Thus, in moving the electrified body from A to B, we first had to overcome a resistance, and to do work upon it equal to ten foot grains, whereas, afterwards it pulls towards B, doing work equal to thirty foot grains. Then, in the whole passage from the point A to the point B, the work done by the body may be said to be twenty foot grains. It is true that, during one part of the passage, it did more than this, but only after having required aid previously.

The path followed in going from A to B will be a matter of indifference, so far as the total work done by or upon the body is concerned. We have a precisely analogous case in gravitation—a body of a pound weight, in falling from a height of forty feet to a height of twenty feet above the sea, will do necessarily twenty foot pounds of work in virtue of that fall, no matter what path it follows. We may lift it above A and do work upon it by lifting it before letting it fall, still the whole work done by the body, in its passage from A to B, and in virtue of that fall, will be twenty foot pounds. It may fall by the most *roundabout* or the most direct road, the work done will be the same. It may fall below the level of A and bound up to A; the whole sum of the work will be unchanged, depending merely on the difference of level between the first and second spot. This work may indeed be represented in various ways. Thus, if the body fall direct through a vacuum, the work appears in the form of what is called actual or kinetic energy; that is to say, it is wholly represented by the motion of the mass. If, on the other hand, the body falls slowly, lifting another weight, the work will be represented partly by the weight lifted, partly by the heat due to the friction of the mechanism; but the work done by the body, due to its fall from one level to another, is constant in amount, however various in form.

The work done in overcoming electrical force, or done by electrical force, is subject to the same law.

In moving a weight from a point A to a point B on the same level, no work, on the whole, is either done upon or by the body in respect of its weight; and, similiarly, in moving a small electrified body from a point, A, to some other point, B, it may happen that the point B is so situated that on the whole no work is either done upon or by the body in respect of the electrical forces in action on the body. In that case the two points might be at the same electrical level or height, but the recognized term, in respect of electrical forces, is potential; the points A and B are at the same *potential*. If one small electrified body, for instance, be moved around another large electrified body, neither approaching nearer nor receding farther from it, and so far from all other conductors as not to be sensibly attracted or repelled by them, it will pass along a path every point of which is at the same electrical potential.

In moving any actual body from spot to spot, some work must always be performed to overcome friction, but, as in moving a heavy body from one point to another, at the same gravitation, potential or level, no work is required in respect of its gravitating properties; so, in moving an electrified body from one point to another, at the same electrical potential, no work is required in respect of its electrical properties, although, of course, work will certainly be required to overcome friction, and may be required in respect of gravitaion, if the body be raised, or in respect of inertia, if we accelerate the motion of the mass.

The potential of a body is the excess or defect of its potential above or below that of the earth in the neighborhood, the potential of the earth at that point being arbitrarily assumed as *nil*.

The potential increases in proportion to the increase of work done by any given quantity of electricity in moving from the point to the earth; and, since the potential is proportional to the work and to the quantity of electricity transferred, and to no other quantity, *the potential of a point is measured by the work which a positive unit of electricity does in passing from that point to the earth.*

The unit quantity of electricity might, so far as this definition is concerned, be chosen arbitrarily, but there is a certain convenience for many calculations in choosing the centimetre for the measure of length, and the force capable of giving in one second a velocity of one centimetre per second to a gramme mass for the unit force; this is known as the electrostatic system of units.

Every point everywhere may be said to be at a certain electric potential, just as every point everywhere may be said to be a certain level above or below a datum line, arbitrarily chosen, such as the Trinity high water mark. In speaking of the potential at a point it is as unnecessary to conceive of the presence of any electricity at that point as it is to think of the presence of a heavy body at a point when we speak of its height above the sea.

The electric potential at the point depends on the electrical condition of all bodies in the neighborhood; that is to say, sufficiently near to exercise any sensible force on a small electrified body at the point. Moreover, in testing the equality of the potential at two points by the work done upon or by an electrified body, in its motion from one point to the other, we must remember to choose a body containing only a very small charge of electricity, which we will call the test charge; otherwise, the mere presence of this test body or test charge of electricity would sensibly change the potential at the point at which it was at the time of the experiment increasing, or decreasing for the time being the work which must be done in order to bring any other small quantity of electricity to that point. At first it might appear as if the analogy of gravitation deserted us here, but this is not so; for if I say that two points, A and B, shall, relatively to the earth, be at the same level when no work is done upon or by a heavy body in passing from one to the other, I must remember that, in placing a heavy body at the point A, I do not change for the time the gravitation level of that point, if the body be of sensible size compared with the earth—for its presence at A has increased the attraction of all other heavy bodies to A, so that for the time being a small weight passing from A to B would do work, the position of the centre of gravitation of the earth having been changed.

The *difference of potential* between two points, A and B, being the difference of condition in virtue of which electricity does work in moving from one point to the other, is measured by the work required to move a unit of electricity against electric repulsion from A to B; or, what is the same thing, it is measured by the work which a unit of electricity would do while being impelled from B to A.

The point A is said to have a higher potential than B if a unit of positive electricity, in passing from A to B, performs the work. It is assumed that the unit of electricity does not disturb the distribution of electricity in the neighborhood.

The conception of the work which must be done upon or by electricity, in passing from one point to another, must be grasped as the only idea which can explain difference of potential. Difference of potential can therefore be expressed in foot grains or any other recognized unit of work.

In this paragraph the work is spoken of as being done by the unit of electricity, simply to avoid the awkward periphrasis, "done by a small electrified

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body charged with one unit of electricity," and "done in consequence of the electric charge only." That is to say, it is the extra work which must be done in moving the body from one place to the other in consequence of its being electrified.

If two electrified conductors, A and B, which are at the same potential, be joined by a wire, no disturbance in the electric distribution on the system will take place, unless, indeed, the wire be of sensible size, relatively to the other conductors, and at a different potential; but, assuming the wire to be small, or at the same potential as A and B, the electricity on the bodies after being joined will be in equilibrium, as before, the necessary condition of equality of potential throughout being satisfied. If, on the other hand, A be at a higher potential than B, positive electricity must, when the connection is made, flow from A to B to reëstablish electric equilibrium.

The amount of electricity thus transferred must be such as will restore the equilibrium; it will be great when the difference of potential is great, and when the size of the bodies is large, and small under the opposite condition.

The magnitude of the conductor has only one influence on the result, by requiring that a larger quantity of electricity shall flow to reëstablish equilibrium. We may illustrate this by an experiment with water. If we join two reservoirs with water, big or little, by a pipe, no flow takes place from one to the other if the surfaces of the water in both are at the same level. If they be not, the flow will take place from the higher to the lower; the quantity of fluid transferred depends on the capacity of the reservoirs and original difference of level; it continues until the level is the same in both. Substitute potential for level, electricity for water, conductor for reservoir, and the above statements are all true for electricity.

By definition, the difference of potential was declared to depend on the work done by or upon electricity in moving from one point to another. The nature of the work done by or upon a quantity of electricity, moved on a conductor by or against a force of attraction or repulsion, is clear enough—a tangible force is used or overcome; a solid body is either put in motion or its motion resisted; but when electricity moves along a wire from a body at one potential to a body at another, no solid body is moved at all, and no equivalent work appears at first sight to have been done. The equivalent is found however, in the heat generated in the wire by the passage of the electricity.

It is well known, from the research of Joule, that 772 foot-pounds of work are equivalent to the quantity of heat which raises one pound of water one degree Fahrenheit, and, although no visible mechanical work is done, when a quantity, Q, of electricity passes along a wire from A to B, heat is generated precisely equivalent in amount to the work which the attractions and repulsions of the electrified bodies A and B would have done when acting upon the same amount of electricity, Q, conveyed on a small moving conductor from the body A to the body B.

Electricity in motion is capable of doing work in other ways, but, in whatever way work or its equivalent is produced by electricity moving from A to B, the amount will always be equal to the quantity of electricity transferred multiplied into the excess of potential of A over B.

Difference of potential may be produced by mere induction, by friction between insulators, followed by separation, or by mere contact of dissimilar conductors. In the latter case the difference of potential is constant with constant materials, *i. e.*, copper and zinc, at a given temperature, touching one another, are invariably at potentials differing by a constant measurable amount. The same may be said of any two metals. Moreover, all metal conductors may be ranged in a list, such that any one of them in contact with any of the conductors later in the list will have a potential positive relatively to that conductor. The exact relative differences of potential have as yet been experimentally ascertained in a few cases.

It is believed that all compound solid bodies which are conductors behave in the same way as simple metallic conductors, so far as the production of a difference of potential due to mere contact is concerned, and this is certainly the case in many instances. Liquid conductors also appear relatively to one another to form a series of the same kind. But compound liquids and solids do not admit of being arranged relatively to one another in the simple order described as applicable to metals.

This difference between the compound liquid and the simple metallic conductor appears to be intimately connected with the fact that electricity, in passing through these compounds, decomposes them. The compounds which are thus decomposed are called *electrolytes*.

The following series of phenomena occur when metals and electrolytes are placed in contact:

1. When a single metal is placed in contact with an electrolyte, a definite difference of potentials is produced between the liquid and the metal. If zinc be plunged in water the zinc becomes negative, the water positive. Copper plunged in water also becomes negative, but much less so than zinc.

2. If two metals be plunged in water (as copper and zinc) the copper, the zinc and the water, forming a galvanic cell, all remain at one potential, and no charge of electricity is observed on any part of the system. (It may be proper to remark that this statement is in direct contradiction to the popular impression.) If the copper (C) and the zinc (Z) had been joined by a metal they would have assumed the same difference of potential as if in direct contact. If, with the two metals, C and Z, plunged in water, a piece of Copper C′ be now joined to the zinc Z, but not in connection with the copper C, C will become positive and C′ negative, the difference of potentials being that due to the direct contact between C and Z only, the water having the effect of simply conducting the charge from Z to C, and of maintaining C and Z at one potential.

3. If a series of galvanic cells be joined up there will be a difference of potentials between the first copper and last zinc equal to the sum of the differences produced by the two joints between zinc and copper; or, taking the difference of potential which a single junction can produce as one unit, the total difference equals the number of junctions. This is Volta's theory of the galvanic battery.

The property of producing a difference of potential may be said to be due to a peculiar force, to which force the name of *electro-motive force* is given. When we say that zinc and water produce a definite electro-motive force, we mean that by their contact a certain difference of potential is produced.

The words *electro-motive force* and *difference of potential* are used frequently the one for the other, but they are not strictly speaking identical. It must be remembered that electro-motive force is not a mechanical force, tending to set a mass in motion, but a name given to the supposed force which causes, or tends to cause a transfer of electricity. Wherever difference of potential is found there must be an electro-motive force; but there are cases in which electricity may be set in motion from one point to another, between which that difference of condition does not exist which we have defined as difference of potential. Electro-motive force is, therefore, the more general term of the two, and includes difference of potential as one of its forms.

Difference of potential or electro-motive force must be measured in terms of some unit adapted to measure work. Every unit of work must be represented by the operation of a force overcoming a resistance, so as to move it through a distance; or, what is the same, it may be represented by the resistance overcome and moved through a distance. In other words, the unit of force exerted through the unit of space is the unit of work. The most common unit of work is the foot-pound, being the weight of a pound overcome so as to be lifted through the distance of a foot, but the so-called absolute unit of work is that which leads to greatest simplicity in electrical calculations. This unit is the absolute unit of force overcoming a resistance through the unit distance, say one centimetre. The absolute unit of work (centimetre, gramme, second) is equal to the foot-pound divided by 13,825 g, where g is the velocity acquired at the end of one second by a body falling in vacuo; taking this as 981 centimetres per second, the absolute unit of work is equal to the foot-pound divided by 13,562,325.

The unit difference of potential, or electro-motive force in electro-static measure, exists between two points, when the unit quantity of electricity, in passing from one to the other, will do the unit amount of work.

The practical measurement of difference of potentials between two points can, in certain cases, be made by observing the work done by definite quantities of electricity in passing from one point to the other; thus we may observe the total amount of heat generated in a wire by a given quantity of electricity passing between two points kept at a constant difference of potentials. From the heat we may calculate the work, and from the heat and quantity we may calculate the difference of potentials. Similarly, if we wished to ascertiain the difference of level between two points, we might let a weight (a standard quantity of matter) fall from one to the other, measure the total heat generated by the concussion which brought the weight to rest, from the heat deduce the amount of work done, and from this work and the known quantity of matter deduce the difference of level or of gravitation potential. Fortunately there are more direct methods available, or engineers would have some difficulty in leveling.

Difference of electric potentials is more generally astertained indirectly by a knowledge of the laws connecting potential with other electrical magnitudes. Thus we know that the quantity of electricity with which two opposing surfaces of conductors are charged is simply proportional to the difference of potential between them, assuming the distance and dielectric to remain constant. Electrometres afford us the means of comparing such quantities as these, and, therefore, electrometres afford us the means of comparing differences of potential.

THE Indo-European Telegraph Company announces that the cable between Madras and Penang, which was interrupted on Sunday, May 11th, having been restored, messages may be again telegraphed direct to Penang, Singapore, China, Japan, Java and Australia, by the lines of this company *via* Teheran. The regular tariff to these places has been resumed, in lieu of the temporarily reduced tariff charged during the interruption.

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MATHEMATICS FOR NON-MATHEMATICIANS.

By William Paget Higgs, LL.D.

Division I.—The Algebra of Constant Quantities.

Multiplication, Involution, and Exponents.

Early in our studies we understood that if a be taken as a kind of short way of writing one apple, $2a$ will stand for two apples; but if a is taken to represent two apples, then $2a$ will stand for four apples; and so on. Similarly, if a be taken to represent the abstract number one, then $2a$ will be equal to 2. If a stand for 2, then $2a$ will equal 4. Thus the figure 2 is a multiplier, and all multipliers in similar position are termed *co-efficients*. In the instance given the co-efficient of a is 2, a numerical co-efficient.

Co-efficients are *numerical* and *literal*. If it is understood that n shall represent any determined number, then na will represent n times a, and n will be the literal co-efficient of a.

It is convenient to indicate the operation of *multiplication* by letters placed together as na. This operation is indicated also by the sign × between two quantities, as $a \times b$, or by a point ·,* as $a \cdot b$. Thus ab, $a \times b$, and $a \cdot b$ are identical in meaning.

It will at once be seen how we may indicate multiplication of a bracketed quantity, as—

$$2(a+b)=2a+2b, \text{ or } n(a+b)=na+nb.$$

And how we may obtain a rule for the removal of the brackets when a co-efficient stands before them—that is, when removing brackets, to multiply all the terms of a bracketed quantity by the co-efficient. As instances the reader may trace out the meaning of the following equations:

$$3ab(x+y)=3abx+3aby.$$
$$n(ax+by)=nax+nby.$$
$$a(b+c)\times(d+e)=(ab+ac)\times(d+e)=$$
$$=abd+abe+acd+ace.$$

We have learnt that a *co-efficient* is a *multiplier*. It is a common error arising from want of accuracy in limiting the meaning of words, to call a constant quantity that is to be added, subtracted, or to be a divisor, by the name of a co-efficient. Such a quantity is more conveniently termed a *constant*. In the expressions $x+c$, $x-c$, c is a constant; in the expression cx, c is a co-efficient.

The idea of multiplication includes the multiplication of quantities having like and unlike signs—that is, we may be called upon to perform the operation of multiplying a positive quantity by a positive quantity, a negative quantity by a positive quantity, and conversely. The multiplication of a positive quantity by another positive quantity will clearly result in a positive product.† But the result of multiplying together two negative quantities, or a negative and positive quantity, is not so apparent. Let us look more closely at the question.

There are four possible cases of multiplication, viz.:

$$a \times b,$$
$$-a \times b,$$
$$a \times -b,$$
$$-a \times -b.$$

The first two are easily understood. In the first case we take a in the number of times represented by b; in the second case we take $-a$, b times. That is, if a is equal to 2, and b represents 3, then $a \times b$ is equal to 6, and $-a \times b = -$, or -2 repeated three times. In the third case, where a is to be multiplied by $-b$, we are directed by the sign of operation to repeat a the number of times represented by $-b$, and as we may always reverse the process and repeat $-b$ the number of times represented by a, the product is again -6. Thus, in both cases where the quantities have *unlike* signs, the product is a minus or negative quantity.

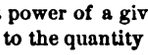
The remaining case of like signs (that of multiplying two negative quantities) it is not so easy to grasp. We must arrive at the result indirectly. The question, numerically stated, is to multiply -2 by -3. If we increase the multiplier (-3) by 4, making it equal $+1$, the product ($--2$) will, of course, be four times too great, and to arrive at the true result we must subtract (4 times -2), or -8. Now, $-2-(-8)$ is, as we have seen when studying subtraction, equal to $+6$.

We have thus arrived at the conclusion, which may be stated as a rule, that the multiplication of quantities having like signs gives a positive product, and the multiplication of quantities having unlike signs gives a negative product. Professor Young concisely states the rule.

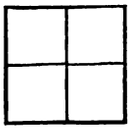
Like signs give PLUS; *unlike signs*, MINUS.

Involution and Exponents.

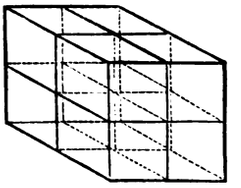
If we desire to multiply a by itself, we may state the result as aa, and repetition of the operation would give aaa. Custom has, however, established a more convenient expression than aa or aaa, namely, a^2 or a^3.* The small figure ^{2} or ^{3} is termed the *exponent*. An exponent shows the number of times a quantity is to be multiplied by itself, or, in technical phraseology, the "power to which the quantity is to be raised." The first power of a given quantity, or a^1, is equal, of course, to the quantity itself. The second power of a given quantity, or a^2, is termed the "square" of that quantity. The third power is termed the "cube." Other powers are known by their ordinal names. The exponent of a *power* must be an integer or whole number; if the exponent be fractional, it indicates a "root," a matter we shall presently describe. The term "square" is derived from the fact that, if we wish to arrive at the superficial contents, or area expressed in square measure of a given space, we may, by multiplying by itself the linear measure of the side of the space, obtain this area; and if again we multiply this area by the given quantity, we have the expression in cubic measure of the solid contents of the space. When referring to geometrical expressions, we should remember that if we represent a line by a, the square built upon that line will be a^2, the solid or cube built upon the square will be a^3. Thus upon a line of two units length—



if we build a square we have, as result, four square units—



and if upon this square we erect a cube, we have eight cubic or solid units—



Geometricians give to the line, the square, and the cube, the term of "space of one, two and three dimensions," respectively. Space of a fourth dimension would be practically inconceivable.

a may then represent space of one dimension.
a^2 " " " two dimensions.
a^3 " " " three "

To be familiar with these ideas, which are really the result of a false analogy, will be necessary when we wish to study the principles of the Differential Calculus; till then they must remain in abeyance, while we consider the use of Exponents as Logarithms.

Negative Exponents, Roots, and the Use of Exponents as Logarithms.

We have learnt that algebraists agree to write, for the multiplication indicated by xx or $xxxx$, the expression x^2 or x^4. And now let us find out for ourselves the effect, upon the exponents, of the addition, subtraction, multiplication, and division of the quantities x^2, x^4.

$xx+xxxx$ and x^2+x^4, or $xx-xxxx$ and x^2-x^4, is the simplest manner in which we can express the addition and subtraction of these quantities.

But when we multiply x^2 by x^4 the product shows us a wonderful property pertaining to the exponents.* Thus:

$$xx \cdot xxxx = xxxxxx, \text{ or } x^6;$$
$$\text{Or } x^2 \times x^4 = x^6.$$

That is, *multiplying the quantities x^2 and x^4 together is equivalent to adding their indices or exponents*; or, $x^2 \times x^4 = x^{2+4} = x^6$.

If we seek to divide† x^4 by x^2, we shall see that $xxxx$ contains xx the number of times represented by xx; that is, xx must be multiplied by xx to produce $xx \cdot xx$ or $xxxx$; and this is but saying that x^4 divided by x^2, or $x^4 \div x^2$, or $\frac{x^4}{x^2} = x^2$. We learn, then, *that dividing the quantity x^4 by x^2 is equivalent to the subtraction of the index (2) of the divisor from the index (4) of the dividend*; or that—

$$\frac{x^4}{x^2} = x^{4-2} = x^2.$$

Now this subtraction of indices naturally includes the extension of the idea to *negative indices*. For if we reverse the position of the quantities given above we obtain a result with a negative index:

$$\frac{x^2}{x^4} = x^{2-4} = x^{-2}.$$

And again, by extending our view of the meaning of the term index or exponent, we may arrive at some remarkable, and, as we shall presently perceive, very

* To prevent confusion with decimal fractions the dot is not employed in numerical calculation.

† The result of multiplying two quantities is termed the *product*; the result of their addition, the *sum*.

* The reader must not confound this expression with $2a$ or $3a$; $a2$ means a times a; $a3$, a times a times a; but $2a$ or $3a$ means twice or thrice a.

* Index is another term for exponent; plural Indices.

† Division is represented algebraically and arithmetically by the sign ÷, or more generally by writing the quantity to be divided above a short line, and the divisor below the line, as in fractions. Thus, 1 divided by 2 may be written $1 \div 2$, or $\frac{1}{2}$; that is, one-half. Similarly, a divided by b is written $\frac{a}{b}$ or $a \div b$. The result of the division is termed the quotient

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useful results. x and x^1 we know to be identical in value, so that—

$$\frac{x^1}{x^1} = \frac{x}{x}.$$

But—

$$\frac{x^1}{x^1} = x^{1-1} = x^0.$$

And—

$$\frac{x}{x} = 1.$$

Whence—

$$x^0 = 1,$$

which expression, if the reader will presently return to it, he will perceive to be the reason or proof that the logarithm of unity to any base is zero; and since $a = a^1$ the logarithm of the base of any system is unity.

Following our reasoning, we may say:

$$\frac{x^0}{x^1} = x^{0-1} = x^{-1};$$

but substituting the value obtained above for x^0—viz., 1—we have:

$$\frac{x^0}{x^1} = \frac{1}{x^1}, \text{ whence we learn } x^{-1} = \frac{1}{x^1} \text{ or } \frac{1}{x}.$$

Unity divided by any quantity is the reciprocal of that quantity. $\frac{1}{x}$ is the reciprocal of x, $\frac{1}{2}$ is the reciprocal of 2. So that *a quantity raised to a negative power is equal to the reciprocal of the positive power of that quantity;* or $x^{-n} \frac{1}{x^n}$, whatever number n may stand for. By which we may arrive at the value of a negative power.

As we can have integral or whole positive and negative exponents, so an extension of reasoning will comprehend fractional exponents. Fractional exponents are employed to indicate *roots.*

A *root* is the quantity that produces a *power.* As the second power or square of 2 is 4, so the square root of 4 is 2. As the third power or cube of 2 is 8, so the cube root of 8 is 2.

The radical sign $\surd$ (a corruption of the letter r) is employed to indicate the lowest or square root of a quantity. And similarly $\sqrt[3]{}$ is employed to indicate the cube root, $\sqrt[4]{}$ the fourth root, &c. Thus:

$$\sqrt{4} \text{ or } \sqrt[2]{4} = 2.$$
$$\sqrt[3]{8} = 2.$$
$$\sqrt[4]{16} = 2.$$

Or, substituting for the radical signs fractional exponents, we have:

$$\sqrt{4} = 4^{\frac{1}{2}} = 2.$$
$$\sqrt[3]{8} = 8^{\frac{1}{3}} = 2.$$
$$\sqrt[4]{16} = 16^{\frac{1}{4}} = 2.$$

Now it is clear that we may read $\frac{1}{2}$ as "the second root of the first power," or as "the (first) root of the second power," for the result is the same, viz., 2. And that—

$$x^{\frac{n}{n}} = x,$$

which is but raising a quantity to a power to reduce it again to its radical or root value.

From our reasoning we may deduce the following *resumé:*

That with powers of the same quantity—

To MULTIPLY, *add* the indices.

To DIVIDE, *subtract* the index of divisor from index of dividend.

To find a POWER, *multiply* the index of the quantity by 2 or 3 or (n) the number of the required power.

To find a ROOT, we *divide* the index of the quantity by 2 or 3 or (n) the number of the required root.

Now since every quantity (a or x) may be written under the form a^1 or x^1, these rules will hold good for all quantities, and admit of the general expressions—

$$x^1 \times x^1 = x^{1+1} = x^2.$$
$$\frac{x^1}{x^1} = x^{1-1} = x^0; \quad \frac{x}{x} = 1; \text{ and } x^0 = 1.$$
$$x^2 = x^{1 \times 2} \text{ (or the index 1 multiplied by 2).}$$
$$\sqrt[2]{x} = x^{\frac{1}{2}}. \text{ (or the index 1 divided by 2).}$$

But, says the reader, what is the practical benefit of all this? We reply, that by a very simple appplication of these principles are our sailors enabled more easily to navigate our ships, the naval architects to design them, the engineer to build our bridges, the astronomer to tell us of the movement of other worlds. The application is Logarithms, without which our laboratories, studies, and workshops would indeed be badly off.

LOGARITHMS.

The term *logarithm* is derived from *ogon arithmos* or the *number of ratios.* Thus, between 1 to 10 there is *one* ratio; between I and 100, two ratios; and between 1 and 1000, three ratios of 1 to 10. The definition has been given that "The logarithm of a number (to a given base) is the index of the power to which the base must be raised to give the number."

Thus if $n = b^l$, l is the logarithm of n the given number to the base b. And if $n = 100$, and b, the base, be 10, then $l = 2$: for—

$$100 = 10^2.$$

If $n = 1000$, then $l = 3$; for—

$$1000 = 10^3; \text{ and so on.}$$

In the following table let n = the number for which we wish to find the logarithm; b, the base; and l, the index or logarithm, and we have:

n		b l
1	=	10^{0} *
10	=	10^{1}
100	=	10^{2}
1000	=	10^{3}

That is, the logarithm of 1 is 0,
10 is 1,
100 is 2,
1000 is 3, and so on.

Consequently, for all numbers between 1 and 10 the logarithm or index is a fraction; between 10 and 100, 1 plus a fraction; between 100 and 1000, 2 plus a fraction. These fractions have been calculated, and are to be found in tables,† of which we shall presently give an example.

The logarithm of a number, n, to a base, b, is usually written $\log_b n$; and so if $n = b^l$,—

$$l = \log_b n.$$

If the last b were 2, and the number 8, the logarithm would be 3, and the expression would become—

$$3 = \log_2 8.$$

But, as our notation is founded upon the decimal system, the base of the common system of logarithms is 10, and this being understood the letter b is omitted. Thus the logarithm of 10 is written log. 10—1.

* We see now the meaning of a^{0-1}, or that the logarithm of unity to any base is zero (^{0}).

† Galbraith and Haughton's should be obtained by the student.

THE UNITY OF NATURAL PHENOMENA.

BY M. EMILE SAIGEY.

As a popular introduction to the study of the forces of Nature, according to the prevalent theories of modern science, for which this work was intended, it deals too largely with the speculative aspects of the subject, without presenting it in the light of an exhaustive analysis, and a systematic exposition. It exhibits the general outlines of what may be called the new physics, but is wanting in ample illustrations, and in lucid consecutive details of the principles of recent important discoveries. The author is too intent on the statement of his private individual views to engage in the elucidation of points of general scientific interest. He throws out many fruitful suggestions, but neglects to trace their bearings and consequences. His work, accordingly, shows the stamp of French vivacity, rather than of German profoundness or English logical completeness. For a beginner, its style is too shadowy for a firm and comprehensive grasp, although to a master of the subject it might need many valuable reminiscences. The author's discussion of the properties of the universal Ether affords a fair specimen of his characteristic manner. He assumes that there is but one substance in the material universe, and that this substance is the ether. This ether is the primitive and most subtle element, the tissue out of which the entire universe is wrought. It is diffused throughout the entire material world, enveloping all bodies, and penetrating into their interstices. Ether is composed of atoms which impinge upon each other, and upon neighboring bodies, forming a universal medium which exerts a constant pressure upon the molecules of ordinary matter. The action of gravity, according to the author, is explained by this hypothesis. Bodies, he affirms, do not owe their gravity to an intrinsic force, but to the pressure of the medium in which they are immersed. The motion of heavy bodies is thus resolved into a transformation of the ethereal motions, and gravity enters into the unity which has been shown to connect all physical forces. It is included in the idea of motion with which heat, light, electricity, magnetism, cohesion and chemical affinity are identical. The idea of matter itself, the author maintains, is thus rendered more clear and simple. The basis of the system is the atom of ether. But we cannot conceive that there are two kinds of matter, differing from each other in their essence. Quite as little can we imagine two systems of mechanics. Since there is but one law for motion, there can be but a single essence for matter, and hence the molecules of ordinary matter must be only aggregates of ethereal atoms. The atom and motion thus explain the universe. One kind of atoms compose the physical world. By virtue of a motion communicated to each other by these atoms, they become so grouped and intermingled as to form simple molecules, and all their compounds. It is to one and the same cause that we must ascribe molecular aggregations in the realm of the infinitely small, and in that of the infinitely large, the gravitation of the heavenly bodies. Admitting the ingenious and subtle character of these reasonings, it cannot be said that in the present state of physical science they amount to positive proof. At the utmost, they can only claim to be considered as founded on plausible hypotheses. They are, therefore, out of place, in a manual designed for popular instruction, and occupy room which might better have been devoted to thorough exposition. The unity of force is no longer a matter of doubtful theory, and the analysis of its principles should not be connected with problems of uncertain solution.

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THE ANGLO-AMERICAN, FRENCH ATLANTIC AND NEWFOUNDLAND TELEGRAPH COMPANIES.

The Anglo-American, French Atlantic, and Newfoundland Telegraph Companies have been consolidated into one Company under the name of the Anglo-American Telegraph Company, with a Capital of £7,000,000. The following table shows the statistics of traffic under the various tariffs, from July, 1866 to August 1, 1873:

One of the Anglo Company's Cables broke on the 6th October, 1870, and the other on the 30th November, 1870. The tariff was increased on the 12th of December to $15, to reduce the traffic and enable the Company to carry it satisfactorily over the French Cable. The increase of the tariff from $7.50 to $15, 100 per cent., reduced the number of messages 17 per cent., and increased the receipts 57 per cent. One of the broken Anglo Cables was repaired June 4, 1871, and the other June 17, 1871. The tariff was reduced to $10 July 1, 1871.

One of the Anglo Company's Cables broke 11th March, 1873, and the French Company's Cable on 20th April, 1873. Rate increased on the 1st of May to $1.50 per word, to reduce the traffic and enable the Company to carry it over the only remaining Cable. The increase of the tariff from $1 per word to $1.50, 50 per cent., reduced the number of messages 5 per cent., and increased the receipts 23 per cent. The French Company's broken Cable was repaired May 20th, 1873, and although the Anglo Cable remained broken the tariff was reduced June 1st to $1 per word.

The receipts in 1872 were larger than in any previous year, and the Companies paid dividends of twelve per cent, but the serious breakages since have demonstrated that the dividends should have been less and a larger sum put to reserve. It is now clear that under no tariff have the Companies in any one year earned sufficient to pay their shareholders a reasonable dividend on this class of investment and at the same put aside a sufficient fund for renewing and repairing their cables.

DATES.	TARIFF.	*Average No. of Messages per Day.*	*Average Amount per Day.*
July 28th, 1866, to October 3 st, 1866, 3 months and 4 days,	$100.00 for 20 words not exceeding 100 letters	29	$3,671.45
November 1st, 1866, to November 30th, 1867, 13 "	50.00 " " " " " "	64	4,209.80
December 1st, 1867, to August 31st, 1868, 9 "	25.00 for 10 words not exceeding 50 letters, and 5 words allowed free for the address	131	4,617. 0
September 1st, 1868, to May 31st, 1869, 9 "	16.87 " " " " " " " " " " " " " "	219	4,728.75
June 1st, 1869, to August 9th, 1869, 2 " and 9 days,	10.00 " "	226	3,627.80
August 10th, 1869, to December 11th, 1870, 16 " " 2 "	7.50 " "	452	5,480.50*
December 12th, 1870, to June 30th, 1871, 6 " " 19 "	15.00 " "	374	8,603.90
July 1st, 1871, to April 30th, 1872, 10 "	10.00 " "	498	8,114.05
May 1st, 1872, to April 30th, 1873, 12 "	1.00 per word	646	9,413.85
May 1st, 1873, to May 31st, 1873, 1 month,	1.50 "	588	11,630.30
June 1st, 1873, to July 31st, 1873, 2 months,	1.00 "	585	7,643.69

*War between France and Germany, July 15, 1870, to May 10, 1871.

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

The acknowledgment of receipt of any assessment is to be understood as an acknowledgment for all previous assessments:

ACKNOWLEDGMENT OF RECEIPTS FOR ASSESSMENTS 44, 45 AND 46 UP TO AND INCLUDING AUGUST 29TH.

8, 15, 19, 27, 31, 44, 51, 53, 55, 56, 65, 69, 78, 83, 99, 100 103, 106, 111, 114, 122, 133, 154, 156, 158, 160, 164, 171, 176, 177, 182, 201, 202, 213, 215, 227, 230, 232, 238, 242, 246, 248, 258, 319, 357, 359, 360, 362, 364, 366, 382, 398, 411, 412, 414, 418, 425, 428, 429, 441, 451, 453, 455, 457, 476, 484, 490, 494, 495, 496, 497, 498, 499, 500, 503, 504, 505, 506, 507, 508, 511, 512, 515, 546, 555, 556, 557, 561, 562, 566, 573, 575, 586, 590, 592, 597, 602, 617, 618, 630, 648, 652, 659, 660, 661, 667, 692, 700, 701, 710, 717, 723, 724, 728, 729, 730, 733, 743, 776, 780, 781, 782, 783, 785, 786, 789, 800, 802, 804, 808, 809, 813, 823, 836, 838, 841, 871, 897, 901, 905, 906, 920, 926, 927, 929, 930, 932, 934, 944, 949, 954, 955, 956, 957, 959, 960, 963, 964, 977, 979, 980, 991, 992, 1000, 1002, 1014, 1016, 1026, 1030, 1031, 1032, 1033, 1034, 1041, 1047, 1048, 1050, 1061, 1063, 1080, 1098, 1100, 1101, 1104, 1127, 1139, 1141, 1153, 1182, 1190, 1191, 1205, 1208, 1211, 1213, 1218, 1221, 1228, 1234, 1235, 1255, 1256, 1268, 1269, 1274, 1275, 1277, 1278, 1279, 1281, 1283, 1284, 1285, 1286, 1290, 1327, 1333, 1339, 1340, 1342, 1344, 1346, 1348, 1349, 1350, 1351, 1352, 1366, 1375, 1379, 1405, 1406, 1421, 1427, 1428, 1430, 1431, 1439, 1450, 1464, 1465, 1469, 1470, 1471, 1474, 1475, 1476, 1479, 1481, 1485, 1495, 1496, 1497, 1503, 1505, 1513, 1514, 1531, 1546, 1553, 1562, 1563, 1572, 1573, 1576, 1586, 1596, 1598, 1599, 1600, 1601, 1603, 1604, 1605, 1606, 1607, 1608, 1616, 1619, 1620, 1633, 1638, 1639, 1640, 1641, 1642, 1643, 1646, 1649, 1651, 1653, 1654, 1655, 1657, 1667, 1669, 1672, 1673, 1676, 1677, 1689, 1690, 1691, 1692, 1696, 1700, 1701, 1702, 1704, 1712, 1715, 1716, 1729, 1731, 1733, 1737, 1743, 1746, 1747, 1765, 1766, 1767, 1777, 1782, 1785, 1786, 1788, 1789, 1790, 1802, 1805, 1806, 1810, 1818, 1825, 1828, 1829, 1830, 1832, 1833, 1834, 1835, 1836, 1837, 1838, 1855, 1856, 1857, 1858, 1860, 1863, 1864, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1888, 1889, 1890, 1891, 1899, 1904, 1918, 1934, 1936, 1937, 1939, 1941, 1942, 1953, 1958, 1962, 1963, 1972, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1991, 1992, 1993, 1995, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2012, 2013, 2020, 2022, 2028, 2037, 2050, 2051, 2053, 2054, 2055, 2056, 2061, 2068.

No. 44.—1209, 1631, 1909.

No. 45.—1289, 1647, 1666.

The notices of assessment covering the death of Robert S. Fowler, who died at Dubuque, Ia., July 21; and that of William P. Trites, who died at Monroe, La., 29th ult., will be sent out on Sept. 1st.

The following additional agents have been appointed:

L. C. Baker, Little Rock, Ark.
H. E. Doolittle, La Fayette, Ind.
S. K. Rupley, Poughkeepsie, N. Y.
T. D. Scanlon, Port Hastings, C. B.
P. Bruner, Wellsville, O.

Members are reminded of the Annual Meeting of the Association, which will be held in New York on Wednesday, November 5th. It is exceedingly desirable that as many as possible of the members, and especially of the agents, should be present, as business of vital importance will be brought before the meeting.

BORN.

BOK.—At Brooklyn, N. Y., August 24, 1873, a son to William J. H. Bok, Translator of Languages to the W. U. Tel. Co., 145 Broadway, New York City.

FARRELL.—At Virginia, Nevada, August 12th, to James F. Farrell, W. U. Tel. Co., a son.

HARTMAN.—To J. P. Hartman, Manager W. U. Tel. Co., Alburtis, Pa., a daughter, on the 27th of July, 1873.

MELLEN.—At Smithson. Mo., August 11th, 1873, to J. H. Mellen, Manager W. U. Tel. office, a son.

WILEY.—At Springfield, Ill., August 12th, 1873, to F. P. Wiley, a son.

MARRIED.

ALLEN—DONOHUE.—Sunday, August 24th, 1873, Stewart C. Allen, of Hudson, N. Y., to Miss Alice Donohue, of Bayonne, N. J.

DAVY—ROBERTS.—On Friday, May 23d, 1873, by Rev. R. D. Austin, Mr. Will. H. H. Davy, of Mansfield, Ohio, to Miss May J. Roberts, of Woodburn, Iowa. No cards.

MILLER—SPENCER.—At Georgetown, California, July 30th, 1873, John H. Miller, Manager W. U. Tel. office, to Ella A. Spencer, eldest daughter of Dr. C. G. Spencer.

POPE—DICKINSON.—At Amherst, Mass., Wednesday, August 6, 1873, by the Rev. Mr. Herrick, Frank L. Pope, of Elizabeth, N. J., to Amelia, daughter of Captain M. F. Dickinson, of Amherst.

To the Editor of the Journal of the Telegraph:

Is there any self-adjusting relay now in use that is a perfect success?

We do not know of any.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, SEPTEMBER 1, 1873.

BLANK No. 47 is now printed upon postal cards, and can be obtained from the Supply Department. They should be used exclusively in place of the old form.

MANAGERS are requested to be careful in stating the Number of Messages Sent on blank No. 4, to place the figures opposite the right classification. In very many instances the statement of the Number Sent Collect at Full Rates and the Sent Paid at Half Rates are transposed, and it is of great importance that they should be reported correctly.

QUITE serious losses have been caused through frequent non-observance of that portion of Rule 9 (Book of Rules), which directs that when a part of the tariff is for other lines, the amount for this line should be first stated and then the amount for other lines. A recent case in which the loss would have been prevented if the proper check had been transmitted will serve as an illustration, although the loss was quite as much the result of careless booking and careless service generally. A special press dispatch of 180 words was forwarded collect from a point upon an other line, and transmitted through with the check, 180 collect, only. Through somewhat indistinct figures upon the received copy the clerk carelessly booked it 18 words, and but $3.86 and $6.00 were collected instead of $31.40 and $46.50. The error was developed through the Error Sheets, but too late to collect the difference, more than $40 of which had been paid to another company.

A MANAGER writes to us that, during his absence, his assistant took in and forwarded a half rate message for an office where half rate messages are not received; and that the repeating office through which it passed, forwarded it to its place of destination as a full rate message, subsequently notifying the sending office of his action. The question is now raised as to whether the action of the manager of the repeating office was right in changing the message from a half rate to a full rate, and forwarding it without waiting for instructions from the sending office. We think it was for the reason that the company became responsible for the exercise of due diligence in the transmission of the despatch as soon as it was received from the customer and paid for, and the holding of the message at the repeating office for insufficient tolls might have resulted in a delay rendering the message useless and the company liable for damages. There is no excuse for taking in messages to be sent at half rates to offices where such messages are not received, and any office which commits the fault must bear the consequences. The tariff books are now so complete, and the rules and directions so full and exact, that no office need err as to the proper charges to be made in all cases. Whenever an insufficient amount is collected, however, the message must not be delayed in consequence, as the fault is not with the customer but with the employe who receives the tolls.

AWARD OF THE GREAT MEDAL OF HONOR FOR THE INVENTION OF THE DUPLEX TELEGRAPH.

We recently had the pleasure of inspecting the great Medal of Honor awarded by the American Institute to Mr. J. B. Stearns, the inventor of the Duplex Telegraph. The medal is made of gold, and is beautifully executed. On the obverse, or face of the medal, are representations of the following objects in relief: The Goddess of Liberty, holding a laurel crown in her right hand, and a staff, surmounted by a liberty cap, in her left; the United States Coat of Arms, a spinning wheel, ship under sail, sheaf of wheat, shuttle, horn of plenty, plow and the Caduceus or Mercury's rod, the symbol of good conduct, peace and power. The rod, representing power; the serpents, wisdom; and the two wings, diligence and activity. The reverse of the medal is surrounded by a wreath of oak and laurel leaves, enclosing the following inscription: The Great Medal of Honor, awarded to J. B. Stearns for Duplex Telegraph, 1872.

The honor conferred by this award, so justly bestowed upon Mr. Stearns by the Great American Institute, which occupies so pre-eminently high a position in the metroplis of the Western World, is greatly enhanced by the fact, that only one Great Medal of Honor is awarded by the American Institute during any one year, and none, unless for an invention of paramount importance.

We trust that Mr. Stearns, who is now in Europe, will receive for his great invention as intelligent and substantial an appreciation in the Old World as he has already received in the New.

WE publish in another part of this issue, a table, showing the average daily receipts of the Anglo-American, French Atlantic and Newfoundland Telegraph Companies, under the various tariffs, from the beginning of the operation of the first Cable, July 28th, 1866, to August 1st, 1873. It will be observed that every reduction of the rates from $100 for 20 words, to $16.87 for 10 words, was followed by an increase in the number of messages sent sufficient to maintain and even slightly augment the receipts. The decrease to $10.00, however, was followed by a loss of 23 per cent. in receipts, while a further reduction to $7.50, coupled with the increase in the traffic, caused by the war between France and Germany, was followed by an increase of 100 per cent. in the number of messages and 51 per cent. in the receipts.

Owing to the breaking of two of the cables in the Autumn of 1870, the tariff was increased to $15, in order to reduce the traffic and enable it to be caried over the remaining cable, and resulted in a decrease of 17 per cent. in the number of messages, and an increase of 57 per cent. in the receipts. In the Summer of 1871 the broken cables were repaired, and the tariff reduced to $10 per message, causing an increase of 33 per cent. in the number of messages and a decrease of 6 per cent. in the receipts.

In May, 1872, the rate was made one dollar per word, irrespective of the number of words sent, and was followed by an increase of about 30 per cent. in the number of messages, and of 16 per cent. in the receipts.

Two of the cables were broken in the Spring of 1873, when the rate was increased to $1.50 per word, and resulted in reducing the number of messages 9 per cent., and increasing the receipts 23 per cent. One of the cables having been subsequently repaired and a new one laid, the tariff was again reduced to $1.00 per word, causing a decrease of 34 per cent. in the receipts.

It appears from the results of the operation of these cables for the past seven years, that the reduction in the rates below $1.50 per word does not tend to materially increase the traffic, while it results in a considerable decrease in the revenue. There is a point where the interests of the public and the stockholders are mutually subserved, and if the present rate shall prove to be that point, it will be shown by yielding a sufficient revenue to pay a fair dividend on the investment, and, at the same time, enable the company to put aside a sufficient fund for renewing and repairing their cables.

ONE of the most severe storms ever experienced in Nova Scotia, occurred on Sunday and Monday, the 24th and 25th insts., and the Western Union and Anglo-American lines were very seriously damaged thereby, the wires being badly broken between every two stations all the way from Dorchester to Port Hastings, a distance of 200 miles, and prostrated for miles east of the latter point, the high tide also sweeping the poles and wires into the sea. Crops were ruined, churches blown down, bridges carried away, and hundreds of houses and barns destroyed, and, saddest of all, a considerable loss of life is reported to have resulted from the hurricane, the like of which has not been experienced there for more than half a century.

THE death, after a short illness, of Charles L. Goodwin, superintendent of the Atlantic and Pacific Telegraph Company, has been commemorated by his late associates, in a series of appropriate resolutions which are to be suitably engrossed and forwarded to the widow of their late friend.

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DIRECTIONS FOR SETTING UP THE GRAVITY BATTERY.

Place the copper plate in the bottom of the glass jar, and put two pounds of sulphate of copper (blue vitriol) on top of the copper plate. Place the copper frame for holding the zinc on top of the glass jar, and suspend the zinc as near the top of the jar as possible. Fill the jar, within half an inch of the top, with water. If you have any of the sulphate of zinc taken from the porous cup of a Daniell's battery, put a teacup full of it in the jar. If you have none on hand, use about two ounces of sulphate of zinc (white vitriol) for each cup. If you have none of this at hand, use the same quantity of Glauber salt (sulphate of soda), or even common salt (muriate of soda). It is not necessary, however, to use anything but blue vitriol and common water. In this case, the two poles of the battery should be connected together in short circuit for twenty-four hours, during which time it will make its own sulphate of zinc, and will be ready for use.

It is better to put the sulphate of copper, sulphate of zinc and water in the jar, and let them stand until the solutions separate before the zinc is placed in the jar. When the solutions have properly separated, the lower part of the jar will contain a blue fluid, and the upper part of the jar a white or colorless fluid. The zinc should always remain in a colorless solution. In case the zinc is put in the jar before the two solutions of sulphate of zinc and sulphate of copper have separated, the zinc will be coated with a dark substance, and should be taken out and carefully washed.

When the water in the upper portion of the jar becomes saturated with sulphate of zinc, the sulphate crystalizes upon the zinc plate, stopping the action of the battery. The conducting power of a solution of sulphate of zinc is greatest when diluted with an equal quantity of water. Part of the solution should, therefore, be from time to time removed and replaced by water.

When crystals form on the top and sides of the cell, in consequence of the water being charged with sulphate of zinc, they should be removed with a damp cloth. A little grease or fat, rubbed on the sides of the jar, near the top, will have a tendency to prevent the formation of crystals.

When all the sulphate of copper has been decomposed, the action ceases, and sulphate of zinc will be reduced upon the copper plate as a black powder. It is necessary, therefore, to provide a constant supply of sulphate of copper. A few crystals of sulphate of copper should always remain in the bottom of the jar, undissolved.

The jars should not be disturbed when in use, as this would cause the solutions to mix. As the water evaporates from the jar, it should be replenished by a fresh supply.

ANY information relating to C. P. Shelden, formerly an operator at Green River Station, on U. P. R. R., will be thankfully received by John Kurtz, Rockford, Mich.

CHANGES IN THE ALPHABETS.

We have received from Mr. Culley, Engineer-in-Chief of the English Telegraphs, the following letters from two of the oldest telegraph superintendents in England, in relation to the changes of alphabets. The first letter is from the Superintendent of the Midland Railway, and the second from the Superintendent of the London and Northwestern Railway.

Mr. Culley does not like the very high speed manipulation, and thinks the risk of irregular working is increased in far too large a proportion to the extra service done, in which opinion we quite agree:

My Dear Sir: Yours of the 20th inst. received. I recollect the various changes of alphabet perfectly well, but I regret I have no records of the particulars.

If my memory is correct, I do not think the changes caused much, if any, obstruction to business, and certainly not for any lengthened period.

As a matter of course, the clerks are very conservative when they think any contemplated change will give them trouble, and, no doubt, if they are consulted, they will suggest all sorts of imaginary evils.

I have lately converted a number of double needle circuits into single needle circuits on the railway lines, and experienced no great difficulty in changing the system. I give the various stations concerned a sufficient notice of the change about to be made, and provide them with instruments to practice upon, and send teachers to assist them. When the change takes place, the manipulation is not quite so rapid for two or three days, but, with the regular working, proficiency is soon acquired.

I changed the Great Western Double to Single needles without any difficulty, except the disinclination of the men to change.

My Dear Sir: In answer to your inquiry with respect to the changes made in the single needle and printing codes, I beg to inform you that the only difficulty that I remember to have arisen was, that, where there were double needle circuits available, a few clerks did not apply themselves to the learning of the new single needle code, and it was found necessary to slightly reduce their pay, until they were reported competent in the new working.

In making the changes, notice was given that the new code would be in operation from a certain time; and I do not recollect that any delays of a serious character arose, or that many errors were made in consequence of the alteration.

THE ATLANTIC CABLE OF 1865.

NEW YORK, 28th August, 1873.

MY DEAR MR. PRESCOTT:

The "Great Eastern" was, on 20th inst., in lat. 51.58 N. and long. 35.46 W. The weather had been very foggy and boisterous, and, out of twenty days, they had only sixty-nine hours of working weather.

With fine weather, Capt. Halpin has great hopes of being successful in recovering and repairing the 1865 cable.

The cable already picked up was in good condition.

Yours respectfully,

CYRUS W. FIELD.

G. B. PRESCOTT, Esq., W. U. T. Co.

WE are happy to announce the convalescence of Mr. J. C. Hinchman, Superintendent of the Metropolitan District, who has been seriously ill of typhoid fever.

To the Editor of the Journal of the Telegraph:

On Saturday the 19th inst., after a severe thunder shower had passed over the city, and after the lightning had in a great measure ceased, a ball of fire (I can compare it to nothing else), about the size of a billiard ball, rolled into the office upon the wire, and before reaching the arrester it seemed to separate, part of it jumping from the wire and becoming dissipated, as it were, in the atmosphere of the room. The other portion passed through the arrester, burning it slightly and forming a connection between the top and bottom plates of the same, rendering its cleaning necessary afterwards. Thence it passed down the ground wire to the earth, doing no damage to the instruments which were in the circuit at the time. It was not accompanied by any thunder, but made a peculiar hissing or snapping sound, and left behind it a sulphurous smell. Its passage over the wire was slow in comparison to ordinary forms of lightning, allowing us time to observe its movements.

Please explain, through the JOURNAL, the nature, &c., of this form of lightning. Does it emanate from the clouds or the earth? If the former, why was it not accompanied with the usual report of thunder? Is it more or less dangerous than ordinary lightning? K.

Lightning passes from the clouds to the earth, from the earth to the clouds, and from one cloud to another with equal facility. There is but one kind.

The ball of fire you speak of was simply a quantity of atmospheric electricity passing over the wire to the arrester. The wire being over-charged, produced vivid light. The scinctillant appearance was due to fine particles of metal being fused by the intense heat. Its slow motion was an optical delusion. The sulphurous smell was due to ozone, produced by the electric spark.

SHEFFIELD, Ill., August 21st.

To the Editor of the Journal of the Telegraph:

I would like your opinion in regard to the following:

A black message is left for transmission over the W. U. Telegraph Company's lines at 4 o'clock P. M. For some cause the message is not sent until time for half-rate business. The party sending the message comes in office, and finds it has not been sent. He then wants to send the same message at half-rate, and have the balance of the money paid back, he having paid for the first message. Should he be allowed to make the change?

Please answer through the JOURNAL, and oblige G. S. K.

The sender of a message has the right of withdrawing it any time previous to its transmission. If, after having withdrawn it, he chooses to substitute another in its place he clearly has a right to do that also. A message written upon a No. 2 blank, however, cannot be sent at half-rate. All half-rate messages must be written on red blanks.

NEWARK, N. J., Aug. 26, 1873.

To the Editor of the Journal of the Telegraph:

Will you please publish, for the information of those to whom the Callaud Battery is new, that, if they will use the fluids (both blue stone and zinc) of their old Daniell Battery, in constructing the new (Callaud), it will work *strong at once.* This will save time and patience, especially the latter, which is valuable. Z. N. D.

THE Duxbury and St. Pierre cable has been repaired, and is now working.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York,
September 1, 1873.

To all Offices on W. U. Lines:

The attention of Offices is called to the order in last JOURNAL giving State Rates to and from Offices of the Montreal Telegraph Company in Canada, (*i. e.*, all other line Offices in New Brunswick, Quebec and Ontario.)

It is to be understood that ALL old rates, whether *higher* or *lower* than new State rates are to be discontinued on and after this date.

In the notice of these State rates in last JOURNAL the word "To," printed before the word "Michigan," should have been omitted.

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Fort Deposit, Ala., re-opened.

Sargent, Ks., closed. Mail inquiries in relation to checks to Newton, Ks.

Business for Greenupsburg, Ky., will hereafter be sent and checked to Riverton, Ky.

Messages may be taken for Dover, Me., to be sent and checked to Foxcroft, Me.

There are now W. U. offices at Cambridge and Wakefield, Mass., square 21. Check direct. Erase delivery charges.

The office at Lenox, Mass., square 40, printed in Tariff Book, should read Lenox Furnace.

Messages may be taken for Princeton, Mass., and delivered from Worcester, Mass. Charges for delivery, twenty-five cents.

Morgan, Mich., the office on Other Lines, printed in Tariff Book, is in Marquette Co., and Morgans, Mich., square 269, new (W. U.) office in last JOURNAL, is in Newaygo Co.

Como, Miss., closed.

Alexandria, Neb., re-opened, square 513.

Business for the following offices on the B. and M. Line, in Neb., can be sent *via* Lincoln, Neb., at the following rates for Other Lines:

Ashland.....	35 and 3	Waverly	35 and 3
Crete.....	35 " 3	Beatrice.....	50 " 4
Dorchester.....	35 " 3	De Witt.....	40 " 3
Fairmount.....	55 " 4	Juniata.....	105 " 6
Grafton.....	65 " 4	Lowell.....	120 " 6
Omaha Junc....	35 " 3	Harvard.....	80 " 5

Business for Twin Mountain House, N. H., will hereafter be checked direct.

White Mountain House, N. H., closed.

Clayton, N. J., closed.

Farnham, N. Y., closed.

The office at Salisbury, N. Y., square 46, is in Orange Co.

West Bank, Lower Bay, N. Y., changed to Dix Island.

The P. O. A. of Mands, O., is Shoemaker P. O., Butler Co.

Aladdin, Pa., closed.

Canton and Minnequa Springs, Pa., are now W. U. offices, square 93. Check direct.

The P. O. A. of Hillville, Pa., is Monterey P. O., Clarion Co., Pa.

Kinzue, Pa., changed to Ludlow, Pa.

Milford, Pa., closed.

The P. O. A. of Fairview, Butler Co., Pa., is Baldwin, Butler Co., and that of Turkey City, Pa., is "Box 316, St. Petersburg, Clarion Co., Pa."

Messages may be taken for Weissport, Pa., to be delivered from Lehighton, Pa. Charges for delivery, 15 cents.

Bonham, Texas, closed.

Messages may be taken for East Fairfield, Fairfield, Franklin Highgate Centre, Highgate Falls, and St. Albans Bay, Vt., to be delivered from St. Albans, Vt. Charges for delivery, 25 cents, except to St. Alban's Bay, which is $1.50, special delivery.

NEW OFFICES.

266 Stonewall, Ala.
266 Tecumseh, "
276 Wilsonville, "
266 Woodstock, "
60 Canterbury, Del.
307 Bartlett, Ill.
299 Chrisman, Ill.
327 Mansfield, Ill.
308 Oakwood, Ill.
299 Ridge Farm, Ill.
307 Roselle, Ill.
307 Tioga, Ill.
289 Raub, Ind.
* Lynn, " 30 2 242 Richmond, Ind.
13 Foxcroft, Me.
14 Leeds Junction, Me.
40 Lenox Village, Mass.
179 Bayport, Mich.
323 Marion, Miss.
332 Wahalak, Miss.
349 Cape Girardeau, Mo.
41 Dix Island, N. Y.
* Prospect House, Upper Saranac Lake, N. Y., 30 2 39 Whitehall, N. Y. Mont. Co.
211 Carroll, O.
232 Covington, O.
140 Buena Vista, Butler Co., Pa.
141 Fairchance, Fayette Co., Pa.
66 Frackville, Pa.
140 Fredonia, Pa.
66 Gilberton, Pa.
140 Harrisville, Pa.
130 Ludlow, Pa.
140 Mercer, Mercer Co., Pa.
66 Mahanoy Plane, Pa.
140 Pardoes, Pa.
140 Pine Grove, Mercer Co., Pa.
93 Roaring Branch, Pa.
* Gladewater, Texas, 50 3 470 Marshall, Texas.

Offices having "Special Sheet A" will check Williamsport, Pa., 30 cents; Gilberton, Frackville and Mahanoy Plane, Pa., 25 cents more than "special rate" to Phila. Square rate not to be increased.

On and after Monday, September 8th, 1873, the following named offices will, unless otherwise specially directed, discontinue the use of all SPECIAL RATES, and adopt instead the Local, Square or State Rates. By "special rates" are meant, all rates at present less than the Local, Square or State Rates.

They will also disregard notices to "Offices having Special Sheet A" in this and succeeding numbers of the JOURNAL.

Other offices, which at present have special rates to any of the offices in this list, will discontinue the use of such rates and adopt instead the Local, Square or State Rates.

Augusta, Ga.	Lockport, N. Y.
Alexandria, Va.	Lynn, Mass.
Amenia, N. Y.	Lake Village, N. H.
Amsterdam, N. Y.	Laconia, "
Albion, "	Lawrence, Mass.
Auburn, "	Mt. Kisco, N. Y.
Augusta, Me.	Macon, Ga.
Ashland, N. H.	Montgomery, Ala.
Brunswick, Ga.	Millerton, N. Y.
Brewsters, N. Y.	Montrose, "
Boston Corners, N. Y.	Medina, "
Barrytown, "	Middleport, "
Baldwinsville, "	Meredith Village, N. H.
Brockport, "	Manchester, "
Belfast, Me.	Middletown, Conn.
Brunswick, Me.	Manassas, Va.
Bath, "	New Hamburg, N. Y.
Bowdoinham, "	Niagara Falls, "
Bangor, "	Newburyport, Mass.
Brookline, Mass.	Newton, "
Brighton, "	Newton Centre, "
Boston Highlands, Mass.	Needham, "
Bridgeport, Conn.	Natick, "
Columbus, Ga.	Newport, R. I.
Croton Falls, N. Y.	New London, Conn.
Copake, "	Norwich, "
Chatham Four Corners, N. Y.	New Britain, "
Carmansville, "	Norwalk, "
Crugers, "	Norfolk, Va.
Cold Spring, "	Oneida, N. Y.
Catskill, "	Peekskill, "
Castleton, "	Poughkeepsie, N. Y.
Cohoes, "	Palmyra, "
Canajoharie, "	Portsmouth, N. H.
Canastota, "	Pawlings, N. Y.
Clyde, "	Pawtucket, R. I.
Camden, Me.	Portsmouth, Va.
Chelsea, Mass.	Petersburg, "
Charlestown, Mass.	Quincy, Mass.
Concord, N. H.	Richmond, Va.
Charlottsville, Va.	Rhinebeck, N. Y.
Charlotte, N. C.	Rome, "
Chester, S. C.	Rockport, Me.
Columbia, "	Rockland, "
Charleston, "	Richmond, Me.
Damariscotta, Me.	Savannah, Ga.
Danville, Va.	Staunton, Va.
Dover Plains, N. Y.	Spuyten Duyvil, N. Y.
Dobbs' Ferry, "	Sing Sing, "
Dedham, Mass.	Staatsburg, "
Exeter, N. H.	Stockport, "
East Boston, Mass.	Stuyvesant, "
Eufaula, Ala.	Schenectady, "
Fishkill, N. Y.	St. Johnsville, "
Fonda, "	Suspension Bridge, N. Y.
Fort Plain, "	Skaneateles, "
Fulton, "	Seneca Falls, "
Fairport, "	Saco, Me.
Freeport, Me.	Salem, Mass.
Franklin, N. H.	Spencer, "
Fisherville, "	Stoneham, Mass.
Fall River, Mass.	Somerville, "
Fair Haven, Conn.	South Boston, Mass.
Gardner, Me.	South Dedham, "
Garrisons, N. Y.	South Braintree, "
Gordonsville, Va.	Tremont, N. Y.
Greensboro, N. C.	Tilton, N. H.
Hillsdale, N. Y.	Thomaston, Me.
Hudson, "	Tonawanda, N. Y.
Hyde Park, "	Tarrytown, "
Herkimer, "	Tivoli, "
Hampden, Me.	Winnsboro, S. C.
Hallowell, "	West Troy, N. Y.
Haverhill, Mass.	Waterford, N. Y.
Hooksett, N. H.	Winterport, Me.
Harrison Square, Mass.	Waldoboro, "
Irvington, N. Y.	Wiscassett, "
Ilion, "	West Newton, Mass.
Katonah, "	Walpole, "
Kingsville, S. C.	Waterbury, Conn.
Lansingburgh, N. Y.	Williams Bridge, N. Y.
Lynchburg, Va.	White Plains, "
Little Falls, N. Y.	Yonkers, "
Lyons, "	

ATLANTIC CABLE BUSINESS.

We are notified that the Cable to Spain "*via* Bilbao" is interrupted, messages, therefore, cannot be forwarded from Great Britain by that route.

The Shanghai and Nagasaki Cable is repaired; messages can now be sent direct by telegraph to Nagasaki.

WILLIAM ORTON,
President

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Aug. 21st, 1873.

Referring to instructions published in JOURNAL of March 15th, 1873, in regard to "addresses," the following additional particulars will be observed:

In cases where the sender of a transfer order is unable to give the precise address of the payee, but believes him to be a well-known resident of the place in which the paying office is located, the words "*address known*" should precede the name of the paying office and be counted as part of the message. For example: Pay John Smith, address known, Albany, N. Y.

This rule will also apply to cases where the sender is a regular customer and has made previous transfers to the same payee.

It is expected that an address or an explanation of its omission, as provided in instructions, will accompany every transfer order, and any violation of this rule should be promptly reported to me.

G. H. MUMFORD,
Vice President.

EXECUTIVE OFFICE.
New York, Aug. 27th, 1873.

On and after September 8th money order offices will be established at the following named points:

In R. C. Clowry's District.—Ellsworth, Kas.; Wichita, Kas.; Parsons, Kas.; Mt. Vernon, Ind.; Shawneetown, Ill.

In G. W. Gates' District.—Woodstock, Vt.

G. H. MUMFORD,
Vice President

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NEW EXPERIMENTS IN THE DETERMINATION OF THE VELOCITY OF LIGHT.

In a late number of *Nature*, July 3d, a correspondent gives a detailed account—aided by numerous illustrations—of "The new experiments for the determination of the velocity of light." Besides the interest which attaches to these experiments because of the ingenuity of the methods employed, the results obtained are of incalculable value at present, since upon a correct solution of this difficult problem, the success of the approaching transit of Venus observations largely depends. The experiments, to which reference is here made, were conducted by M. Alfred Cornu, of Paris, who, by the aid of perfected apparatus, has overcome various serious objections, and obtained results which may be regarded as final. By M. Cornu's method, a ray of light from a brilliant lamp is sent—after being concentrated by a suitable mirror—between the teeth of a cog-wheel, the revolution of which is effected by clock-work and recorded by electricity. The ray of light, emerging from the openings between the cogs, pass on to a distance of six and a half miles, that is, from the observatory in the Paris Polytechnic School to the barracks on the Valerian Hill. In one of the rooms in these barracks the mirror and collimator were established. The ray, having traversed this space, is reflected so as to bring it back to the point of departure. If the revolving motion given to the wheel is sufficiently rapid, the ray, on its return, meets a tooth in the cog-wheel, instead of an opening, and is, therefore, interrupted. But, if the speed of the wheel be doubled, the returning ray passes through the following opening, and so forth, alternately for increasing rates of revolution. By the aid of a telescope, for observing the ray as it emerges on its return, and an ingenious and accurate electric recorder, the observer obtains all the data needed for future computations. Owing to the lack of clearness in the atmospherc over and surrounding Paris, together with ascending currents of hot air, M. Cornu had great difficulty in obtaining constant results, being forced to make over one thousand experiments, six hundred and ninety of which he calculated. The average thus obtained gave, for the velocity of light, one hundred and eighty-nine thousand three hundred miles (189,300) in a second; by dividing this number by the refractive indices of the air (1,0003), we obtain the number, one hundred and eighty-nine thousand two hundred (189,200) miles in a second in a vacuum; there is a possible error in this value of about one three-hundredth. The Danish observer, Rœmer, from data obtained by calculating the eclipses of Jupiter's satellites, deduced a velocity of one hundred and sixty-seven geographical miles per second. Fizeau, by the aid of an apparatus somewhat similar to that described above, made the rate one hundred and eighty-three thousand miles per second; and Foucault, using a rotating plane-mirror, together with a stationary reflector, deduced a velocity of one hundred and ninety-one thousand miles per second.

A FINE old gentleman, named Plane, died at Belvidere a few days since, at the highly respectable age of 107 years. He was "hale and hearty"—those men who get into the hundreds always are. People were in the habit of betting that he was only 75 years old, such a fine, fresh, youthful character was he. A Chicago newspaper says: "His habits through life were those of temperance and *vactility*." If this is a typographical error, what shall we read for *vactility*? And if it isn't, what, in the name of Noah Webster, is vactility? We ask because we want to live 107 years, be the same more or less.

GEO. H. BLISS & CO.

SUCCESSORS TO

BLISS, TILLOTSON & CO.,

41 *THIRD AVENUE*,

CHICAGO, ILLINOIS,

MANUFACTURERS AND DEALERS IN

Telegraph Machinery and Supplies,

GALVANIZED AND PLAIN WIRE,

INSULATORS,

AND EVERY DESCRIPTION OF

OFFICE AND BATTERY MATERIAL

ALWAYS ON HAND.

INSTRUMENTS REPAIRED AT SHORT NOTICE.

CALLAUD BATTERY.

L. G. TILLOTSON & CO.,

SOLE MANUFACTURERS IN THE EAST.

ORDERS SOLICITED.

No. 8 DEY STREET

NEW YORK.

PENSACOLA TELEGRAPH CO.

C. L. LE BARON, *President.*

CHARLES LE BARON, JR., *Sec'y and Treasurer.*

PENSACOLA, FLORIDA.

OFFICES IN

PENSACOLA, FLA. PERRY PASS, FLA.

MOLINO, FLA. MILTON, FLA.

PENSACOLA JUNCTION, FLA. BAGDAD, FLA.

Connect with the lines of the WESTERN UNION TELEGRAPH COMPANY at Pollard, Ala.

Governed by the same Rules and Regulations as the Western Union Telegraph Company.

WATTS & COMPANY,

Baltimore,

MANUFACTURERS OF

Electrical and Telegraph Instruments

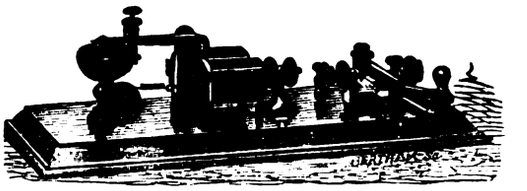
AND

MATERIAL OF EVERY DESCRIPTION,

RELAYS, KEYS, SOUNDERS, COMBINATION SETS, Etc., Etc.

Nickel Plated Goods a Specialty.

A VERY SUPERIOR MAIN LINE SOUNDER.



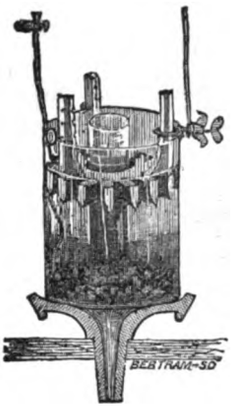
ENTIRELY NEW.

Furnished in a small black walnut box—which holds pens, pencils, paper, wire, pliers, etc., for opening temporary offices at breaks, etc. It is a complete railroad outfit, and supplies a want which has long existed.

SOLE MANUFACTURERS OF THE

NEW PATENT BALTIMORE BATTERY

MADE IN THREE SIZES.



No. 1.
Size of Glass, 8x7½ inches,
Specially adapted to Railroad Signals, Printing Instruments etc., etc.

No. 2.
Size of Glass, 8 x 6 inches.
For Locals and Main.

No. 3.
Size of Glass, 7 x 5 inches.
For Light Main.

This Battery is most extensively used throughout the Country having proven the cheapest, and least trouble to maintain of any in the market.

Patented Dec. 31, 1872.

ALSO, SOLE MANUFACTURERS OF THE

Patent Circuit Closer Key,

O'Sullivan Self-closing Key,

Scott's Patent Hotel Annunciator

by which guests telegraph their wants to the clerk, and avoid waiting to have the boy come and see what is required.

ALSO, OF THE

PATENT BATTERY INSULATOR

shown, holding a cup of the Baltimore Battery in the above cut, which most effectually insulates the Battery as the drip passes *off through a hole in the Insulator.*

The Electrician of the Western Union Telegraph Company, Mr. PRESCOTT, says of it:—"I think your Battery Insulator is very admirably adapted for the purpose designed, and it ought to receive general adoption."

Also, ELECTRIC GONGS of all sizes.
RAILROAD SIGNALS.
SWITCH BOARDS, any Pattern.
A CHEAP DIAL INSTRUMENT for Private Lines.
All kinds of BATTERY MATERIAL.
WIRES.—Rubber, Kerite, Silk and Cotton Covered Office—all Sizes.

Insulators.

BROOKS, SCREW GLASS, RUBBER HOOK.
CROSS ARMS, PINS, BRACKETS.

Repairers' Tools constantly on hand.

Importers and Dealers in best English and American Galvanized Wire.

MANIFOLD PAPER, for Train Orders, etc. Also, AGATE PENS.

In fact, everything used in connection with TELEGRAPH LINES we are prepared to furnish, and equip any length of line in the shortest possible time. Having our own Foundry, we can furnish Brass Castings of any description at moderate prices.

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L. G. TILLOTSON & CO.

No. 8 DEY STREET, NEW YORK,

MANUFACTURERS, IMPORTERS,

AND

DEALERS IN EVERY DESCRIPTION

OF

TELEGRAPHIC

AND

Electrical Apparatus.

Sole Agents for RICH'D JOHNSON & NEPHEW'S celebrated Line Wire.

" " BISHOP GUTTA PEROHA CO.'S Cables and Insulated Wires.

" " CAUVET Pat. Screw Insulators.

" " AMERICAN COMPOUND WIRE COMPANY.

" " BROOK'S Patent Paraffin Insulators.

" " HILL'S Patent Galvanic Battery.

" " LECLANCHE Patent French Battery.

MANUFACTURERS OF

Premium Registers, Relays, Keys, Pocket Magnets, Sounders, Switch Boards, Circuit Closers, Cut-Outs, Lightning Arresters, Paper Reels, Carbon Battery, Daniell's Battery, Grove Battery,

IMPORTERS OF

QUICKSILVER, PLATINUM, ETC.

ENTIRE EQUIPMENT FOR TELEGRAPH LINES

Of any Length, always on Hand.

Sole Proprietors and Publishers of

SMITH'S MANUAL OF TELEGRAPHY,

☞ REPAIRING TOOLS, STATIONERY, ETC.

Putt's Mechanical Telegraph Instrument.

THE LECLANCHE BATTERY.

This Battery (the invention of GEORGE B. LECLANCHE of Paris) possesses great advantages over any other now in use, in its *great endurance*, its *cleanliness*, its *economy* and its *simplicity*.

We have now perfected arrangements by which we shall at all time be able to supply the rapidly increasing demand in this country.

PRICES:

No. 1, per cell, - - - - -	*$2.25*
" 2, " - - - - - -	*1.80*
" 3, " - - - - - -	*1.75*

L. G. TILLOTSON & CO.,

Sole Agents for the Leclanche Battery Co

Address of

LECLANCHE BATTERY COMPANY

No. 40 West Eighteenth Street.

F. L. POPE & CO.

Manufacturers and Dealers in

Telegraph Instruments and Supplies

OF EVERY DESCRIPTION,

38 Vesey Street, New York.

New and Superior patterns of

STANDARD TELEGRAPH INSTRUMENTS.

Their RELAYS, SOUNDERS, and KEYS which have been specially designed by Mr. F. L. Pope, are elegantly designed, thoroughly well finished and scientifically adapted to the service required and are recommended as SUPERIOR TO ANY HITHERTO OFFERED.

In addition to these ALL DESCRIPTIONS OF TELEGRAPH MATERIALS AND SUPPLIES are furnished, such as

INSULATORS, BATTERIES,
INSULATED WIRES,
CHEMICALS., ETC, ETC.
MAGNETIC AND DIAL INSTRUMENTS.

We have for sale also THE NONPAREIL TELEGRAPH INSTRUMENT for amateurs, learners and short lines.

A COMBINATION SET, comprising Sounder and Key on a handsome rosewood base.

Bradley's Box Relays and Sounders.

Bradley's Apparatus for Electrical Measurement.

Bradley's Naked Wire Helices and Magnet Spools to order.

any desired size and resistance, at manufacturers' lowest price.

Descriptive Circular and Price Lists forwarded upon application to

F. L. POPE & CO.,

P. O. Box 6010 *38 Vesey St., N. Y.*

THE LECLANCHE BATTERY CO.

Offer for Sale this celebrated Battery,

(SECURED BY LETTERS PATENT,)

Of which they are the exclusive owners in this country.

Over 300,000 are now in use in Europe,

and have recently been adopted by the French Government in preference to the Calland, which had been used by them for several years.

WE RECOMMEND THEM FOR

Telegraphy (open circuit), Railroad Signals, Hotel Annunciators, Burglar Alarms, Electric Bells, Clocks, &c.

AMONG ITS NUMEROUS ADVANTAGES ARE—

ABSENCE OF ACIDS AND SALTS OF COPPER,

ITS GREAT CLEANLINESS,

WONDERFUL DURABILITY,

ECONOMY IN RUNNING EXPENSES,

ENTIRE ABSENCE OF ODOR.

This Battery will last without any attention from six months to three years.

A large number of Cups are already in use in this country on Burglar Alarms, Electric Bells, &c., and are giving entire satisfaction. The Western Union has a number of Cups put up November 26th, 1872, that are still running.

For further particulars apply to

THE LECLANCHE BATTERY CO.,

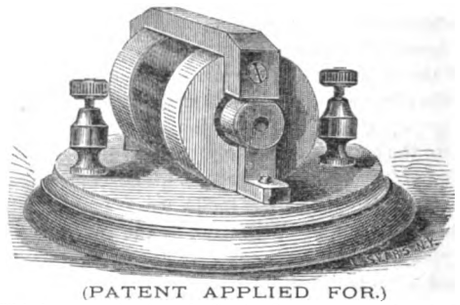
No. 40 West Eighteenth Street.

L. G. TILLOTSON & Co., Sole Agents,

No. 8 Dey Street, New York.

SOMETHING NEW.

"The Rattler" Telegraph Sounder.



(PATENT APPLIED FOR.)

This is a very simple and effective Instrument, and, as it does not require any spring to draw the lever back, is always adjusted.

PRICE, - - - - $3.50.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N. Y.

TILLOTSON'S EXCELSIOR

Telegraph Instrument.



(PATENT APPLIED FOR.)

This apparatus is constructed of the best material, and finished equal to any Telegraph Instrument, and is warranted first class in every particular. It is especially adapted to the requirements of Students of Telegraphy and the operation of Private Telegraph Lines.

Price, complete, Sounder and Key mounted on finely finished, Mahogany Base, with one Cell Hill's Patent Battery, with Chemicals, eight feet of Office Wire, and "Smith's Manual of Telegraphy" $7 50

Two sets..... 14 50

Price of Sounder and Key only..... 6 50

" " " with Cut Out and Lightning Arrester attached..... 7 50

SEND FOR CIRCULAR.

L. G. TILLOTSON & CO.

No. 8 DEY STREET, N. Y.

TILLOTSON'S NICKEL PLATED

POCKET RELAYS,

IN HARD RUBBER CASES.

A most convenient and useful Instrument for Telegraphers—equally available for the office or the field. Will work readily on an ordinary circuit of 300 miles, and only occupies a space of 5 x 2 inches.

Illustrated on page 56 of our Price List.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N. Y.

TILLOTSON'S

MAIN LINE SOUNDERS

AND

BOX RELAYS,

NICKEL PLATED OR IN BRASS.

Illustrated on page 64 of our Catalogue.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N. Y.

TILLOTSON'S

NICKEL PLATED INSTRUMENTS.

We furnish all our machinery Nickel Plated at a small advance over the price of the same articles in Brass.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N. Y.

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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 20. NEW YORK, SEPTEMBER 15, 1873 WHOLE NO. 141.

MEASURING INTERNAL RESISTANCE OF BATTERIES.

There are various methods of measuring the internal resistance of batteries.

The Clark method requires a thick wire, or shunted differential galvanometer. The battery is connected in circuit through one-half the galvanometer only, and the deflection noted; it is then connected through both halves of the galvanometer, and resistance added until the deflection is reduced to its first amount: the resistance added will then be equal to the internal resistance of the battery.

For measuring the internal resistance of a battery by this method with the differential galvanometer, manufactured by the Western Union Company, (Fig. 1,) the following method is employed: Connect the positive pole of the battery with C, and the negative with 3, inserting a plug at A, and also in the orifice marked $\frac{1}{100}$ on the left-hand side of the galvanometer. When the key is depressed only $\frac{1}{100}$ of the battery current will flow through one-half of the galvanometer coil, $\frac{99}{100}$ passing through the shunt. The deflection of the needle must be noted. Now, connect the positive pole of the battery with thumb-screw 4, and the negative pole with one end of the rheostat, the other end of which attach to the thumb-screw 3. Insert plugs at both shunts and at A and B. The portion of the current which flows through the galvanometer now passes through both halves of the coil, and the deflection of the needle is consequently increased. Now remove the pegs from the resistance coil until the deflection of the needle is the same as it was when the current passed only through one-half of the coil, and the resistances unplugged will be equal to the resistance of the battery.

The Gaugain galvanometer is admirably adapted to measuring the internal resistance of batteries by the Clark method. As thick wires are used, no shunting is necessary.

The sine or tangent galvanometer may also be used for measuring the internal resistance of batteries. When either of these galvanometers is connected in circuit with a battery, and a certain number of degrees of deflection is obtained, by adding resistance until the sine or tangent of the deflection is reduced one-half, we are certain that the resistence is doubled, and, therefore, that the resistance added is equal to the original resistance. If we deduct, therefore, the resistance of the galvanometer and connections from the resistance added, we shall obtain the resistance of the battery.

The following method was suggested by Sir William Thomson:

Connect in a circuit with the battery, a resistance coil R, and a galvanometer G, and note carefully the deflection; then introduce a second wire S, between one pole of the battery and the other; this will of course weaken the influence of the battery current, and the deflection of the galvanometer will become lessened; now decrease the resistance of the rheostat, R, until the deflection of the needle becomes as great as before, and call the new resistance r; then—

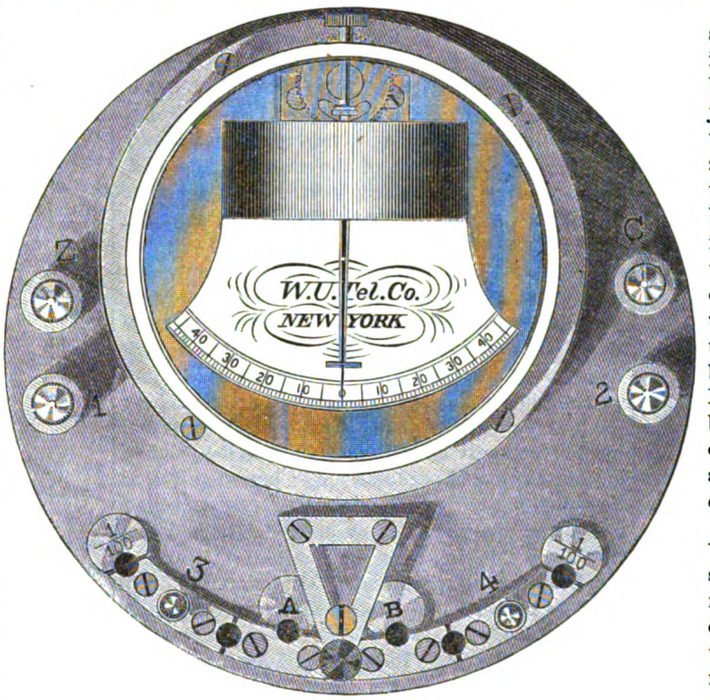


Figure 1.

$$\text{Resistance of battery} = S \times \frac{R - r}{r + G}.$$

The following method may be employed by a galvanometer whose deflections are proportional.

Let D be the deflection obtained with the battery in circuit with a galvanometer, and some resistance r, and d the deflection with some larger resistance R,

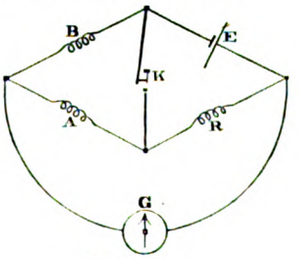


Figure 2.

(the resistance of the galvanometer being included in R and r); and let a=the resistance of the battery.

Then $D : d :: R + x : r + x$,

and $x \frac{(d \times R) - (D \times r)}{D - d}$.

In using this method any other resistance y may be included with x, and the formula becomes—

$$x + y = \frac{(d \times R) - (D \times r)}{D - d},$$

and by deducting x we get the value of y; or, if y be large in comparison with x, the latter may be neglected. By this method one resistance r may be compared with another.

Mance's method consists simply in substituting the battery of which the resistance is to be measured for the resistance in one branch of the Wheatstone bridge, and adjusting the resistances until the needle of the galvanometer which is deflected from zero maintains that deflection constant, when contact at the cross wire of the bridge is made and broken. In the following illustration, (Fig. 2), A, B, E, and R are the four sides of a Wheatstone bridge, K a contact key, G the galvanometer, E being the battery whose resistance is to be measured. Now when AE=BR the resistance becomes determined, or, supposing A and B to be two equal resistances, E and R will be equal. Having placed the battery in one of the branches of the bridge, we make and break contact at K, and if there be no change in the deflection we know that AE=BR, and $E = \frac{BR}{A}$. Practically the result is independent of the galvanometer resistance. It is convenient to give to the constant branches of the bridge a ratio by which the unplugged resistance may be multiplied.

The method admits very easily of experimental proof; for if we make the resistance R great, we shall have a larger deflection when K is open than when pressed down; but if R is small, then when K is pressed down we shall have the larger deflection. Evidently there must be some value for R at which the closing or opening of K does not effect the deflection; and if A and B are equal, this value will be the resistance of E.

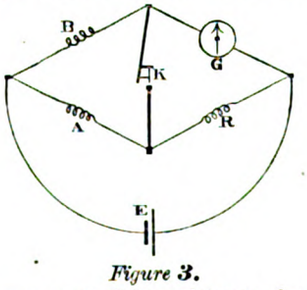


Figure 3.

The measurement of the resistance of a battery is difficult, since the resistance is subject to considerable variation during the time of making the measure. And because the constancy of strength of current passing in a circuit is dependent upon the constancy of the resistance of that circuit, many methods

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which are not cognisant of this variation in strength of current give only doubtful results. In Mance's method the results are to be depended upon, because the variation of strength of battery current does not affect the measurement of the resistance, since all branches are proportionally subject to the variation.

Sir William Thomson has adapted Mance's method for measuring the resistance of the galvanometer when in actual use. The measurement is effected simply by interchanging the galvanometer and battery, as in the next illustration, (Fig. 3.) If AG—BR=O no current will be produced in K, and consequently the deflection of the galvanometer will remain the same whether K be closed or open. When this occurs the resistance of—

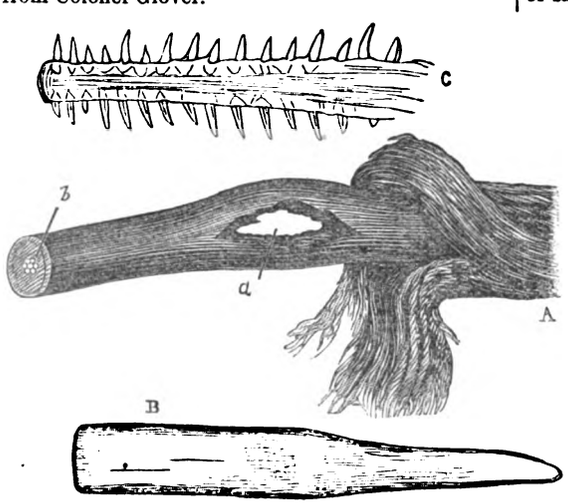
$$G=\frac{BR}{A.}$$

Thus the galvanometer is made to measure its own resistance at one constant deflection.

INJURY TO SUBMARINE CABLES.

When submarine cables were first proposed, much trouble was anticipated from the boring of marine animals, through their external envelopes, and thus allowing the water to penetrate to the conducting wires. It was thought, also, that in time, a cable would become covered with adherent mollusks and similar objects, which would be likely to attract fishes and other inhabitants of the sea, the teeth of which might produce serious mechanical injuries. Although such results have not followed to so great an extent as was feared, experience has shown that these apprehensions were well founded. The cable between Florida and Cuba, for instance, is thought to have received serious injury from turtles nibbling at the sea weeds, &c., incrusting it, and we now learn that on one occasion the cable between Singapore and Penang, in the China Sea, became defective, and when taken up, was found to have been perforted by the teeth of a saw-fish, which tore away the coverings, and laid bare the conducting wire.

The accompanying illustration, which is made the actual size of the injured portion of this cable, shows clearly the nature of the injury, and demonstrates in a very satisfactory manner, the truth of the conclusions arrived at, in the following communication from Colonel Glover.



A hempen rope, A, is tightly coiled around the gutta percha portion of the cable. This was, of course, underneath the iron wires which formed the outside of the cable. In the middle of the gutta percha the copper wires are seen embedded at *b*. In the middle of this gutta percha there is a jagged hole, exactly the size and shape of that given in the drawing. A minute observation of the interior of the wound will show that three of the wires at this point are snapped right across, the broken ends being all thrust in the same direction, namely, away from the spectator as he examines the drawing. The remaining four wires (there are seven at the point *b*), however, remain intact. The uninjured wires can be seen at the lower side of the wound, the weapon which made the hole having missed them.

The following information was received from Colonel Glover, R. E.: "The cable was laid on December 11, 1870, and its tests were satisfactory. It worked well until March 1, 1871, or three months afterwards, when a serious fault had developed itself, which prevented working. A vessel went out, found the fault, and repaired it on the 7th June, 1871. The fault was 222 miles from Singapore, and in thirty fathoms water, the bottom being marked sand and mud. The report which came home to us was that a bony substance had been found jammed hard in the cable through the wires, and it was supposed to have been done before laying. As we could not understand why the original tests should be good if the substance had not existed, and why failure should be sudden, I did not believe this; and on receiving the faulty specimen I went to Willoughby Smith, and we opened it together. The bony substance appeared to us as a fish tooth, probably a shark's; but as no mark of the other jaw appeared, we were puzzled, and give it to you. This is all the information we possess, nor, indeed, can get more, as no persons have seen it since."

I confess I was exceedingly puzzled with this most difficult problem. The hole towards the spectator is two-thirds larger than it is on the opposite side. If it had been an ordinary fish, such as a shark, there ought to have been the marks of a bite on both sides of the cable, namely, of a tooth in both the lower and upper jaws. This wound, therefore, must of necessity have been made by a fish having but one tooth, and one tooth only; but what fish is there that has only one tooth? For several weeks I placed the specimen on my mantelpiece, and was constantly thinking over the puzzle. At last one day I hit it off all of a minute. On going round my museum I observed with most intense interest a beak or saw of a sawfish, (*pristis antiquorum*) presented to me by Dr. Day, Inspector of Indian Fisheries, the fish having been taken in the Andaman Islands. "That's the fellow," I said to myself, "that made the hole in Mr. Latimer Clark's telegraph cable;" so, taking one of the teeth out of the beak of the sawfish, I placed a spare portion of the telegraph cable on the table, and struck the end of the tooth with the mallet, and immediately produced a wound almost, I must say exactly, similar to that found on the Penang telegraph cable. This tooth is seen at B.

My theory is very simple, namely, that the perpetrator was a big sawfish. The cable lay at the bottom of the sea, when one day a sawfish came by hunting for his dinner. The sawfish gets his food by waving his saw right and left, turning up the mud or sand in order to dislodge the delicate bodied marine creatures on which he subsists. His teeth will tell us he cannot eat hard substances. When thus engaged in his submarine diggings, he suddenly came across the telegraph cable. His beak getting entangled in it, he gave it an extra blow and a smash downwards, and finally, getting enraged, hit it so hard that one of his teeth went between the outer wires—through the hempen rope—and then through to the gutta percha, injuring the wires. These various substances probably then held the tooth somewhat tightly. The fish then struggled and broke his tooth short off, leaving a bit of it actually imbedded in the cable among the wires.

I am inclined to think that the sawfish uses his formidable weapon to stir up the mud in search of his food, because the points of the teeth in the saw, which are composed of very hard bony substance, are as sharp as the tips of a wild boar's tusk, which are kept finely pointed by constant friction.

RELATION BETWEEN ELECTRICAL AND CAPILLARY PHENOMENA—*M. Lipman.*—When a drop of mercury in a glass vessel, and covered with sulphuric acid, is put in communication with a point of copper or iron passing through the acid, it suddenly becomes more convex, and an electric current is produced which polarizes the surface. The surface contraction is due to a change of capillary constant; this and the electromotive force of polarization are continual functions of each other. Reciprocally, an extension of surface produced mechanically polarizes it as an electric current would. M. Lippman varies the capillary constant of a surface of mercury in a glass tube, by polarizing it with a current from a Daniell element, causing a deformation of the meniscus. He constructs a very sensitive capillary electrometer (for measuring electromotive forces), consisting of a thin glass tube of mercury, which he puts under the object-glass of a microscope for observation of the meniscus as affected by the current. Replacing the pile in the above case by an electrometer or galvanometer, and displacing the mercury mechanically, it can be shown that the electromotive force is varied, the quantity of electricity being independent of the form of the surface, and simply proportional to the area. He also constructs an electro-capillary motor. Two masses of mercury in acidulated water serve alternately as negative electrodes to the current of a Daniell element. In each mass are partially immersed a set of glass tubes open at both ends. At each inversion of the current one set rises, the other descends, and this alternate movement is transformed, by levers, &c., into one of rotation.

MATHEMATICS FOR NON-MATHEMATICIANS.

By WILLIAM PAGET HIGGS, LLD.

DIVISION I.—THE ALGEBRA OF CONSTANT QUANTITIES.

Logarithms (continued).

Before we proceed to the indices of intermediate numbers, we will first apply our deductions to the numbers with which, as logarithms, we are already acquainted.

Logs.	0	1	2	3	4	5	6
Nos.	1	10	100	1,000	10,000	100,000	1,000,000

Rule I.—The sum of the {logarithms / exponents} of two numbers is equal to the {logarithm / exponent} of their product.

Rule II.—The difference of the {exponents / logarithms} of two numbers is equal to the {exponent / logarithm} of the quotient* of these numbers.

Rule III.—The {logarithm / exponent} of the *n*th power of a number is equal to *n* times the {logarithm / exponent} of the number.

Rule IV.—The {logarithm / exponent} of the *n*th root of a number is equal to the *n*th part of the {exponent / logarithm} of the number.

* Or result of division.

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These rules comprehend the entire use of logarithmic tables, and we will now proceed to their application.

Example to Rule I.—

Log. 100=2
Log. 1,000=3
Log. 100,000=5

$100 \times 1{,}000 = 100{,}000$.

Example to Rule II.—Log. 100=2. Log. 100,000 =5. Five less two =3, and 3 is the log. of 1,000; 100,000 divided by 100 gives 1,000.

Example to Rule III.—The third power of 10 is 1,000. Three times the log. of 10 (or 3 × 1) is the log. of 1,000.

Example to Rule IV.—The cube root of 1,000 is 10. The result of dividing the log. of 1,000 (or 3) by 3 is 1, the log. of 10.

The examples will appear to the student to be self-evident, and it may be thought that logarithms afford only a tedious method of doing what might be more easily done by other rules. But it should be remembered that in practice far more difficult numbers occur than it would be wise to select for illustration.

Having mastered the use of logarithms as integral numbers, we have to deal with the logarithms of those numbers intermediate to 1 and 10, 10 and 100, 100 to 1,000, &c. The logarithms of those numbers between 1 and 10 must, it has been shown, be a fraction less than 1, because the log. of 10 is only 1. Between 10 and 100 the log. of the intermediate numbers is 1 plus a fraction; between 100 and 1,000 the log. is 2 plus a fraction, and so on; because 10 (the base) must be raised to the second-plus-a-fraction-power to give a number higher than 100.

The integral portion of the logarithms of higher numbers than 10 is termed the *characteristic* of the logarithm, and the fractional portion is termed the *mantissa.** In logarithmic tables generally the characteristics are omitted, because it is easy for the calculator to find them by the obvious rule that "*the characteristic of the logarithm of a number is always* ONE LESS *than the number of integral figures of the number.*" This will be seen in the following table of logarithms of numbers from 1 to 20, whence, if we take the log. of 19 (which is 1·27875), we shall find the characteristic† 1 is one less than the number (2) of integers contained in 19.

TABLE OF LOGARITHMS OF NUMBERS FROM 1 TO 20.‡

No.	Log.	Arithmetical Complement.
1	0·00000	0·00000
2	0·30103	0·69897
3	0·47712	0·52288
4	0·60206	0·39794
5	0·69897	0·30103
6	0·77815	0·22185
7	0·84510	0·15490
8	0·90309	0·09691
9	0·95424	0·04576
10	1·00000	0·00000
11	1·04139	0·95861
12	1·07918	0·92082
13	1·11394	0·88606
14	1·14613	0·85387
15	1·17609	0·82391
16	1·20412	0·79588
17	1·23045	0·76955
18	1·25527	0·74473
19	1·27875	0·72125
20	1·30103	0·69897

* A Latin word, meaning an additional handful, something over and above. Plural "mantissæ."

† The characteristic is also termed the index.

‡ We do not include in these lessons an extended or practical table of logarithms, because such a table would absorb valuable space, and is rendered unnecessary by the many excellent pocket and other tables published at a low price.

The student will notice that the log. of 20 is, as far as the mantissa is concerned, the same as the logarithm for 2, and this arises from the fact that 2 bears the same ratio to 10 as 20 does to 100. Similarly the log. of 200 is 2·30103; of 150, 2·17609. He will notice, too, the column headed Arithmetical Complement. The arithmetical complement of a log. is the difference of the mantissa of that log. from unity. The use we shall describe presently. Let us now apply to various examples our four rules previously given.

Rule I. *Example.*—To multiply 90 and 120.

Log. 90 = 1·95424
" 120 = 2·07918
Log. 10800 = 4·03342

A result which the student may verify by reference to a table.

Rule II. *Example*—To divide 418 by 2·4. The log. of 2·4 is 0·38021, the characteristic being 0, because there is only one integer in the number, but the student looks for the log. of 24 in the table.

Log. 418 = 2·62118. The difference between the two logarithms is 2.24097, the log. of 174·16.

It is a law that (as we shall see when we study the subject of division) to divide by any number n is productive of the same result as to multiply by its reciprocal, $\frac{1}{n}$. So it follows that to subtract log. n produces the same result as to add log. $\frac{1}{n} = 0 - \log. n$.

Thus we have a reason for the use of the arithmetical complement. And if we substitute for the log. of the divisor its arithmetical complement, then adding instead of subtracting, we arrive at a similar result.

Log. 418 = 2·62118
A. C. of 2·4 = $\bar{1}$·61979
Log. 174·16 = 2·24097

This step introduces to our notice the expression $\bar{1}$, or that of a *negative* characteristic; and this again leads us to treat of logarithms of numbers less than unity. The logarithm of a fraction or a number less than unity must possess a negative characteristic; for as the log. of 10 is 1, the log of 0·1 or $\frac{1}{10}$ is 10^{-1}, and of 0·01 or $\frac{1}{100}$ or $\frac{1}{10^2}$ is 10^{-2}, according to the rule given which states that "a quantity raised to a negative power is equal to the reciprocal of the positive power of that quantity; or $x^{-n} = \frac{1}{x^n}$, whatever number n may be a fraction. Therefore the log. numbers—

between 1 and 0·1 lies between 0 and —1.
" 0·1 " 0·01 " —1 " —2.
" 0·01 " 0·001 " —2 " —3.
&c.

Hence the following rule:—If the decimal be in the first, second, or third or nth place to the right, the characteristic will be $\bar{1}$, $\bar{2}$, or $\bar{3}$ or $\bar{n}$. Thus, in the tables, the mantissa of the log. of 275 is 0.43933; and—

log. 275 = 2·43933,
log. 27·5 = 1·43933,
log. 2·75 = 0·43933,
log. 0·275 = $\bar{1}$·43933,
log. 0·0275 = $\bar{2}$·43933,
log. 0·00275 = $\bar{3}$·43933.

From this we can clearly understand that the multiplication of a number by any power of 10 affects the characteristic only of the logarithm, and not the mantissa. And from what has gone before it will appear that given a table of the logarithms of prime numbers* it would be easy to calculate all the logarithms of composite numbers.

The calculations with negative indices are made by the rules of algebra. Thus, if it were required to add two of the logarithms given above,—as 2·43933 and $\bar{3}$·43933,—we add first the mantissæ, and obtain 0·87866, and then prefix the result of adding 2 to $\bar{3}$, viz., $\bar{1}$. $\bar{1}$.87866 is the log. of 0·75625. As examples of multiplying and dividing with negative characteristics, we may select the following:—

To multiply $\bar{3}$·43933 by 5.

$$\begin{array}{r} \bar{3}\cdot43933 \\ \times\quad 5 \\ \hline \bar{13}\cdot19665 \end{array}$$

The 2 carried on from the last multiplication of the mantissa is added to the —15, and the result (—15+2) = —13, the logarithm of a very small fraction.

To divide $\bar{13}$·19665 by 5.

The most ready method of division will be to increase the negative characteristic so that it may be an exact multiple of 5, and compensating for the increase, thus:—

$\bar{13}\cdot19665 = \bar{15} + 2\cdot19665$, and this divided by 5 gives $\bar{3} + 0\cdot43933$, or $\bar{3}\cdot43933$.

We may add to these examples illustrations of Rules III. and IV. as to the process of involution and evolution, or the finding of powers and roots by means of logarithms.

Example to Rule III.—Required the 6th power of 18.

Log. 18 = 1·25527
6
7·53162 = log. 34,012,224.

Required the 6th root of 34,012,224.

6)7·53162 = log. 34,012,224.
1·25527 = log. 18.

Next we shall proceed to the consideration of methods of extending the use of ordinary logarithmic tables, and to explain how a system of logarithms calculated to a base, b, may be re-calculated to another base, B.

WORK OF THE ...

...cently issued, giving statistics of new work executed by the Telegraph Department of the Post-office, shows that from the 5th February, 1870, to the 31st March, 1872, a total of 46,146 miles of wire has been erected, 215 miles of underground telegraph laid down (including 23 miles of pneumatic work), and 248 miles of cable submerged. The total number of new instruments brought into use during the same period, less those which have been removed, is 6,421. These figures include private telegraph work.—*London Telegraph, Aug.* 8.

The military telegraph line from San Diego to Prescott and Tucson, Arizona, is being pushed forward vigorously under the direction of the quartermaster and George S. Ladd, contractor. A distance of twenty miles south of San Diego has been completed. The party commenced work last week south of Prescott. There are material and equipment for 630 miles of line on the ground.

* A prime or prime number is a number that cannot be divided except by itself or by unity without remainder; 5, 13, 17, 19, 61, &c., are primes.

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CORRESPONDENCE.

To the Editor of the Journal of the Telegraph:

Although the discussion in your excellent paper relative to a change in the telegraphic alphabet of this country has been vigorously progressing for several months, the interest of practical telegraphers in the matter seems in no wise to have abated, but rather to have increased.

This is not surprising, however, for most persons become as much attached to their *mother tongue* as to their native land, and very few, indeed, can contemplate anything like a radical change in the language to which they have always been accustomed without decided aversion.

The phonographers, for example, have demonstrated, most conclusively, that the use of silent letters in the structure of words is productive of more useless toil and perplexity than all other sources of difficulty in written language combined. They have proved to us that the true way to spell or write a word is to put into it as many letters as it contains elementary sounds, and no more; that a written language, to be correct, must contain as many letters as there are rudimental sounds of the human voice; that the scientific way to spell dough is, do; to spell beau is, bo; to spell phthisic is, tizik; and so on through the entire vocabulary.

While nearly every intelligent person is willing to concede that the leading principles laid down by these linguistic reformers are correct, it is, nevertheless, apparent that the *reform* moves but slowly.

It has taken, perhaps, the best part of a century to give ax the preference over axe; harbor, over harbour; savior, over saviour; plow, over plough; yet the tendency to drop the silent or unnecessary letters from words unquestionably prevails, and must, sooner or later, materially simplify and perfect our orthography.

In short, one of the leading and most hopeful characteristics of civilized man is his disposition to correct abuses and imperfections wherever he finds them. It is hoped that the telegraphic fraternity will not prove a solitary exception to the general rule.

The Morse alphabet is the dialect, so to speak, of the American operator. It is his *mother tongue*, and "with all its faults he loves it still."

comes so much ardently love it is certainly but its imperfections, or whether his passion for it be lutely perfect, simply because Prof. M[illegible] of seeing it, he evidently permits his fancy and reverence to run away with his reason.

He might as well insist that the printing press of Johannes Gotenberg was faultless, and fully equal to the wonderful printing machinery of to-day; or that Hans Lippesheim's telescope was as perfect and powerful an instrument as the ones now in use, which unveil the very hills and valleys of the moon; or that the magnificent "floating palaces" now coursing the waters of the globe in every direction, are in no respect an improvement upon the rude steamboat built by Robert Fulton.

That the Morse alphabet is defective in at least one important particular, must be evident to all who have ever had occasion to use it.*

Perspicuity has long been regarded as one of the most essential elements of good composition.

I think it was Quintilian, the great Roman rhetorician, who said that clearness requires, "not that the reader *may* understand if he will, but that he *must* understand, whether he will or not." If this element is so important in the structure of sentences and paragraphs, is it not equally so in the formation of letters and words?

It seems to me that every letter should be so radically different from all other letters, or combinations thereof, as to render a *confusion of characters* utterly out of the question.

As the spaced letters of the Morse alphabet do not possess this requisite, in my humble opinion they should be expunged and perfect ones substituted.

This would involve the learning by telegraphers of six new characters, c, o, r, y, z and &.

Perhaps the following would answer for substitutes as well as any:

c ——·——·, o ———·——, r ——·——·,

y ——·———, z ———··, & ·———·——·

There is not one operator in a thousand who could not learn them all, thoroughly, in less than one month. A large majority would master them inside of a week.

Why worry along with dull tools when sharp ones are within such easy reach. E. J. UDELL.

Rantoul, Ill., Aug. 15, 1873.

To the Editor of the Journal of the Telegraph:

If you will pardon my obtrusion, and allow me space, I would like to offer a few reasons why I do not agree with the author of the article in your issue of July 15th, relative to Telegraphic Instructions in Public Schools. In the outset, while the writer was discussing broad and general principles, no one could object to the fairness and truthfulness of the declarations. But when specially mentioning telegraphy as a branch to be taught in public schools, I feel compelled to enter my feeble protest. The author says telegraphy can be readily acquired by any intelligent scholar, and in the same connection laments, with commendable boldness, the over-production of poor and indifferent operators. Now let us see from past and every day experience if the above-mentioned theory is not destined to swell rather than diminish the circle of incompetent pretenders—frauds I would almost say.

First, I think that it would, from the fact that however easily the first rudiments of telegraphy may be acquired, yet demands of a teacher that which they cannot get at school, that which they can never possess, save in the experience gained in years of thorough, actual application at the desk of a busy even the best [illegible] art of telegraphy, I argue that in public schools than you can more teach it fishermen in some office in New York City, without the very necessary essentials, "brook" and "trout." Think of a man placed for the first time in his life on a locomotive, with all that he can learn from books and teachers at school. Imagine a student graduating from college on Saturday, and on Monday following is intrusted with money and men to locate and prepare for the iron rails, the bed of a railway through some of our hilly countries, where to-day the iron horse is treading. As ludicrous as these illustrations may appear, I offer them as parallel to the idea of teaching telegraphy in our public schools. It appears to me the only proper school for this branch of education is in the office where the business is transacted, where, while the student is progressing in the art they can study all the intricate and perplexing obstacles that are of such frequent occurrence, and must be overcome before the student is competent to engage in the active work, and which never would occur, and could not be easily explained in school.

Suppose each district superintendent, together with managers of offices in his district, select only such candidates as they deem proper, and as many as they need to keep up their force, and give them thorough and practical instructions in their respective offices, receiving therefor proper considerations, and in five years time our ranks would be comparatively free from plugs, and the fraternity at large incalculably benefited. Some of the most important railway lines have adopted this plan, and its good effect is truly magical in driving some who would be failures in the art to where they belong, "chopping cord wood."

AN OBSERVER.

FORT GAINES, CLAY CO., GEORGIA, July 18th, 1873.

To the Editor of the Journal of the Telegraph:

Having read with some interest the communication of Mr. Clayton, of Prairie City, Ill., and that of "Old Member," in the last two numbers of the JOURNAL, in reference to restricting payments to heirs and legatees to one thousand dollars, and feeling considerable interest in that part of our association, I would beg leave to make a suggestion to the committee. Why would it not be a good plan to form Classes A, B and C in the concern, and have and keep just one thousand members (if it can be so arranged) in each class? As fast as its ranks are depleted, both by death and defaulters, add new members, or the last that joined, to it, to keep it full, thereby allowing all who may wish to join all the classes, and secure the advantages for his widow and family at his death. This will give all an equal showing, according to his abilities, to pay up for the different assessments in one or more classes. We would be willing, I dare say, to be taxed 25 cents every three months, to meet contingent expenses—printing, postage, books, and all necessary outlays as are unavoidable.

I think, at a glance, every one would see and know that if he is only a member of Class "A," he would only be assessed for the death of any member of his class only; and instead of raising the initiation fees to $2.50, let it remain at $1.50, as it has always been, and then we would be most likely to always keep all the classes full. Tax us the 25 cents quarterly for necessary purposes: it's but one dollar for twelve months. Many, or I may say nearly all of us, squander five times that amount very foolishly, when, if it was appropriated that way, it may relieve multitudes of suffering. I agree that ours is no scheme for speculation for anybody; but at the same time, if [illegible] by such an arrangement secure to our little [illegible] hence, let us do what we can for the education and maintenance of our dear wife and little ones while we can.

NUMBER 425.

To the Editor of the Journal of the Telegraph:

As most of your correspondents are opposing the change of alphabet, I will say a few words in its favor. I think there is but few that judge, or are able to judge, the result of a change correctly; for how do these opposers know that a change would create such fearful confusion as they are talking of? Have they ever had any experience in the matter, and are they sure that their opposition is not more based upon their individual disinclination of learning the new alphabet, and the little trouble connected therewith, than upon their desire to protect the company and public from disastrous consequences? Any one who has paid attention to the matter can

* The word *rice* furnishes a good illustration:

Is it ryo or rice? . . . . . .

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see very plainly that there is a considerable part of selfishness in this opposition. I have, since eleven years, changed alphabet three times; but never had I, nor other operators who changed with me, the least trouble in making these changes. There is no use in upholding the spaced letters in the present Morse alphabet. They are doubtless the cause of the greater number of mistakes made in this country, and if the spaced letters are removed there is so much gained. I have used the Continental alphabet for five years, and, admitting that it is longer than the American Morse, I know that it is better than any other that I have seen without spaced letters. I have received thousands of messages with the Continental, in languages which I did not understand, and never to my knowledge made a mistake. This cannot be done with the American, if the sender does not write at a speed which would make the Morse twice as slow as the Continental. The time gained over the Continental alphabet at present could be made up, if private conversation on the various wires would be prohibited.

RAILROAD OPERATOR.

To the Editor of the Journal of the Telegraph:

I am glad to see that the alphabetic discussion is dying out, and a question of still greater importance to the Company introduced. The D. H. and office business is a far more expensive white elephant than spaced letters, and, as your suggestions are not very generally adopted, I want to see an executive order forbidding the use of the wires for comparing check errors, or for sending *free* requests for answers to messages, asking if messages were delivered, &c. I receive several messages (office, of course,) daily of this kind, and in all cases messages are delivered promptly according to contract. Frequently the receivers of despatches are not ready to answer, or prefer to answer by mail, and for this reason office messages are constantly passing over the wires, at the expense of the Company, to "hurry up answer," and sometimes the receiving office furnishes the information *free* what "message was received, and party says will answer by mail!" Our rules are plain enough on this subject: "When a message *cannot* be delivered, the receiving officer must notify the office where the message originated, &c." When an office does *not* receive such notice, he is justified in assuming that the message was received and delivered, and, as I understand it, has no right to send one or more messages free for a party because they paid for the first.

I am not in favor of making operators pay for their own messages, as one correspondent suggests, unless they are of a trivial nature, and of this our officers can judge from the copies sent with free message report. If they think the nature of the business did not justify the use of the wires, make the sender pay full rates, or if it is evident that the message was sent in the interest of a third party—who is not an operator or employee—make the sender pay for it.

In short, we need an order compelling all check error business to be done by mail, and forbidding office messages unless paid for at half rates, as provided for in the rules of the Company, and restricting operators message to their own business of an urgent nature.

OPERATOR.

To the Editor of the Journal of the Telegraph:

I wish to make a suggestion in regard to advertising; or, in other words, letting the public know of the late reduction of rates by the Western Union Telegraph Company. Here we have no means of advertising this, except verbally, and we don't, as a general thing, like the idea of stopping every one we meet and tell them what a sweeping reduction the Western Union Telegraph Company made in rates on July 1st, 1873. I would suggest a neat little calendar, headed Western Union Telegraph Company, and a sheet of heavy ruled paper beneath it, with places to write the names of all prominent and other points local to the town which it may have an office in. Something like the following:

	10 wds.	Each wd. over 10.
To St. Louis, Mo	50	3
" Kansas City	40	3

and so on.

Have one in every merchant's store, and every farmer's house. The people will keep them on account of the calendar and not destroy them. It pays insurance companies to do this, and I can't see why it wont pay a telegraph company.

There are a great many merchants and farmers and mechanics who would use the telegraph if they knew it was so cheap—they have no idea of the cheapness of it. Telegraphing on business, or speculating purposes, is now very much cheaper than mail facilities. A merchant can order his goods by telegraph and have them home in his store, in some cases, before a letter by mail would reach his manufacturer. A great many people would use it socially if they knew it was so cheap. Here in the West nearly every one, farmer and merchant, have their near and dear relatives in the East and South, and in case of sickness would use the telegraph freely, and it would be a great consolation to them. This Company should be advertised in every post office and store and blacksmith shop and schoolhouse in the country.

J. H.

To the Editor of the Journal of the Telegraph:

During a heavy "thunder storm" a question arose among some of the citizens of this place and myself in regard to the danger of having a wire connected with a house. The wire in question is a small "Broom wire," working sounders by local batteries.

I took the ground that it had *little* or *no* attraction for lightning, and that its *capacity* as a *conductor would not be sufficient* to carry a charge of lightning that could injure a building. Admitting that, in the event of lightning coming in *direct contact* with this wire, would not receive only a proportion equal to its capacity as a conductor, and allow the remainder *to escape*, or else be *melted* by the contact. As this, no doubt, is of some interest to many of us, I would like to hear the facts of the case. Approve the tion: Do the latest scientific

R. L. M.

virtue of "lightn

It is not at all likely that the house will be injured by lightning chargeable to the presence of the wire. We have never seen any scientific researches that condemned lightning rods. If lightning rods are properly constructed, and have good earth connections, they are good protection from injury by atmospheric electricity. A telegraph wire attached to a house, is, to the extent of its capacity, a protector, and the greater the number of wires the less will be the liability to injury.

To the Editor of the Journal of the Telegraph:

Suppose I receive a message "Collect," for a man who does not want to pay charges on the same, but wishes to send an answer "Collect,"—should I send the message or refuse until charges are paid on the one received? Please answer in JOURNAL.—E. J. R.

Answer.—You should exact a guarantee in *cash* from such a person. You cannot refuse a message when the rules are conformed with.

To the Editor of the Journal of the Telegraph:

What length of time should the receiver of a message be allowed to answer "Collect" without guaranteeing the same, when no instructions are given by the sending office?

Birmingham, Ala.

Answer.—Not longer than twenty-four hours.

To the Editor of the Journal of the Telegraph:

How many words is "St. James," when it is the name of a steamboat?—a vexed question on our circuit. I claim it is two, based on your decision for St. Albans, Vt., in JOURNAL July 1.

W. G. K.

Answer.—Two words. See Book of Rules, page 10.

To the Editor of the Journal of the Telegraph:

A message was handed me by a customer. I had him read the proper names before I sent it, so as to avoid mistakes, as mistakes and bulls often occur by not understanding the message before the customer leaves. The message handed me contained the word menifee. I asked the customer if it was menifee, or menafee. He said it was menifee. I sent the message as written, and the receiving operator says I bulled it. Now, has an operator a right to change the spelling of any proper name after handed him for transmission; but is it not the duty of the receiver to take as sent? J. A.

Answer.—See rules 7 and 20.—Messages must be sent as written.

G. E. M.—There are twelve words in the following:

"Stewart's note unpaid, and protested; shall I sue?

(Signed) F. M. HOLMES.

Forwarded from Dover, N.H."

B., OPR.—There are eight words in "Lookout for package by fast line this evening."

M. A. TEMPLE.—There are three words in the following message:

To "Charles L. Cole, Assistant General Freight Agent, Pennsylvania Company, Pittsburgh, Pa.

Come without fail.

(Signed) THOS. MCLANAHAN."

The date, address and signature of a message is not charged for. A full address is always desirable to insure quick delivery.

SD.—See reply to "M. A. Temple."

J. SMITH.—There are thirteen words in "C ratchet gear three hundred and so as it is eighty wood mower cod." The Company cannot bably means collect meaning of messages handed may m transmission.

D. J. E.—A knowledge of phonography will avail you nothing as a telegraph operator with the systems of telegraph now in use.

OPR., S. H.—Instead of sending so many office messages, asking—Why no answer, &c., you should have made the customer acquainted with Rule 13, a proper observance of which would probably have afforded satisfaction.

J. HENRY.—We cannot inform you of the different methods in use for train signaling by electricity, nor of the number and names of those patented in this country. We believe that there is a patent log for ascertaining the speed of vessels.

AN OPR.—The proper way to check yourself upon a message destined to a point not upon the lines of the Western Union Company, and which is covered by a frank to the connecting office, would be to enter the amount received in the Total Receipts column, and the same in the column headed Received for other lines, making a note under the head of Remarks.

REX.—A good sound operator can always obtain a good salary. The Superintendent must be consulted as to the precise figures.

C. D. THOMPSON.—Be more explicit.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York.
September 15, 1873.

To all Officers on W. U. Lines:

The following changes and additions have been made since the date of the last circular:

GENERAL INFORMATION.

Hollister, Cal., is now a W. U. office. Erase other line tariff.

Hereafter the "tariff for other lines" to Edwinton, Dac., will be 175 and 12 from Chicago, Ill.

Nameoki, Ill., re-opened; square 348.

Atkinson, Ind., closed.

Until further notice, offices will refuse half-rate business for Shreveport, La.

Old Orchard Beach, Me., closed.

Fort Point, Me., closed.

Hampden, Me., changed to Hampden Corner, Me.

Wenham, Mass., closed.

The rule for counting words in messages to Mexico, directs that words which express amounts should be counted for as many words as it takes figures to express the same. Thus, *one thousand* would be counted as four words—four numerals being necessary to express the amount, one thousand.

Messages for Mexico, however, should be counted as per W. Union rules, but the amount charged for other lines should be sufficient to pay for as many words as the messages contain when counted according to the Mexican rule.

The "tariff for other lines" to Henderson, Minn., is 125 and 8, from Chicago, Ill.

Leaf River, Minn., changed to New York Mine, Minn.

Crookston, Minn., closed.

Sardis, Miss., closed.

Water Valley, Miss., closed.

Georgetown, Neb., closed.

Boars Head, N. H., closed.

Farragut House, N. H., closed.

Sea View House, N. H., closed.

Ocean Grove, N. J., closed.

Harford Mills, N. Y., re-opened.

Liberty, N. Y., square 101, is in Steuben Co.

Crystal Springs, N. Y., closed.

Messages may be taken for West Farms, Westchester Co., N. Y., and delivered from Morrisania, N. Y. Charges for delivery, 25 cents.

The office at Carroll, O., square 202, printed in Tariff Book, is in Fairfield Co., and Carroll, square 211, new office in last JOURNAL, is in Ottawa Co.

Seville, O., changed to Pike Sta., O.

Adamsville, Pa., changed to Atlantic, Pa.

Goldsboro, York Co., Pa., closed.

Penobscot, Pa., P. O. A. is Mountain Top, Luzerne Co., Pa.

Pine Grove, Pike Co., Pa., changed to Mast Hope, Pa.

Penningtonville, Pa., is now W. U. office, square 59. Check direct.

[illegible] W. U. office. square 93. Check direct.

Chester Heights, closed.

Summit City, Butler Co., Pa., changed to [illegible] Pa.

Pleasant Grove, Tenn., closed.

Clarksville, Texas, printed in Tariff Book with "tariff for other lines" from Brownsville, is in Cameron Co.

Sewall's Point, Va., closed.

Menasha Junction, Wis., changed to Hilbert.

NEW OFFICES.

* Fifth Siding, Dac.,	175	12	307	Chicago, Ill.
* Wapeton, Dac.,	175	12	307	"
357 Briar Bluff, Ill.				
298 Donovan, Ill.				
336 Rutland, Ill., check Wenona, Ill.				
261 Antioch, Ind.				
* Auburn, Ind.,	35	2	261	Fort Wayne, Ind.
356 Julien, Iowa.				
* Beulah, Iowa,	75	5	307	Chicago, Ill.
* East Orange, Iowa,	150	10	307	"
* Hospes, "	150	10	307	"
* Seney, "	150	10	307	"
* Sheldon, "	150	10	307	"
* Sibley, "	150	10	307	"
* Wesley, "	125	8	307	"
523 Bunker Hill, Ks.				
* Beaver Dam, Ky.,	50	5	273	Elizabethtown, Ky.
* Cecelia, "	25	2	273	"
* Caneyville, "	45	4	273	"
* Litchfield, "	40	4	273	"
* Millwood, "	40	4	273	"
* Mercers, "	60	6	273	"
* Rockport, "	5[illegible]	5	273	"
385 Lafourche, La.				
11 Hampden Corner, Me.				
19 Sault St. Marie, Mich.				

The tariff to square 19, from offices whose rate to square 127 is 40 c., will be $1.00; from offices whose rate to square 127 is $1.25, will be $2.00; from all others 50c. more than rate to square 127.

128 Rogers City, Mich.				
* Alexandria, Minn.,	150	10	307	Chicago, Ill.
* Dover, "	75	5	307	"
* Eagle Lake, "	125	8	307	"
* Fergus Falls, "	150	10	307	"
* Grand Forks, "	175	12	307	"
* Hancock, "	150	10	307	"
* Hobart, "	150	10	307	"
* Kandiyohi, "	150	10	307	"
* Kasota, "	125	8	307	"
* Kerkhoven, "	150	10	307	"
* Maple Plain, "	125	8	307	"
* Marshall, "	150	10	307	"
* Melrose, "	150	10	307	"
* Muskoda, "	175	12	307	"
* Meriden, "	125	8	307	"
* New York Mine, Minn.,	150	10	307	"
* Newport, Minn.,	100	7	307	Chicago, Ill.
* Norman, "	150	10	307	"
* St. Joseph, "	150	10	307	"
* Sleepy Eye, "	150	10	307	"
* Stillwater Junc., Minn.,	100	7	307	"
351 Popes, Miss.,				
370 Piedmont, Mo.				
* Exeter, Neb.,	100	5	474	Plattsmouth, Neb.
	45	3	474	Lincoln, "
* La Platte, "	35	3	474	Plattsmouth, "
			474	Lincoln, "
* Louisville, Neb.,	35	3	474	Plattsmouth, "
			474	Lincoln, "
46 Chester, N. Y.,				
2 Great Village, N. S.				
180 Olmsted Falls, O.				
180 Pike Sta., O.				
159 Atlantic, Pa.				
58 Mast Hope, Pa.				
140 Modoc City, Pa.				
59 Phoenixville, Pa.				
330 Bradford, Tenn.				
* Camp Douglass, Wis.,	75	5	307	Chicago, Ill.
* Carlton, Wis.,	75	5		"
* Chilton, "	50	3		"
* Clay Banks, Wis.,	75	5		"
* Dane, "	60	4		"
* Elkhart, "	50	3		"
* Fairchild, "	109	7		"
* Fredonia, "	50	3		"
* Germantown, Wis.	35	2		"
* Gill's Landing, "	60	4		"
* Grafton, "	35	2		"
* Green Lake, "	60	4		"
* Hayton, "	50	3		"
* Hilbert, "	60	4		"
* Kewaunee, "	75	5		"
* Kiel, "	50	3		"
* Ogdensburg, "	75	5		"
* Orford, "	40	3		"
* Rosendale, "	60	4		"
* Sherwood Falls, Wis.,	50	3		"
"	60	4		"

OFFICES HAVING SPE[illegible] SHEET A,

Will check Phœnixville, Pa., 25 cents more than "[illegible]" to Phila. The square rate not to be increased.

On and after October 1st, 1873, unless authorized by special notice before that date, the use of all *exceptional* or *special* rates, TO or FROM any of the offices named in the following list, will be discontinued, and the Local, Square, or State rates (whether an advance or reduction in rates is made by the change) will be adopted.

The offices named in this list will disregard all notices to "Offices having Special Sheet A" in this and succeeding numbers of the JOURNAL.

Allentown, Pa.,	Lackawanna and Bloomsburg Junc., Pa.
Audenreid. "	Mauch Chunk, Pa.
Beaver Meadows, Pa.	New Brunswick, N. J.
Bethlehem, "	Northumberland, Pa.
Cambridgeport, Mass.	Nanticoke, "
Catasauqua, Pa.	Parryville, "
Centre Valley, Pa.	Pittston, "
Coopersburg, "	Penobscot, "
Coatesville, "	Plymouth, Pa.
Carbondale, Pa.	Rahway, N. J.
Easton, "	Stemton, Pa.
Elizabeth, N. J.	Summit Hill, Pa.
Eberdale, Pa.	Sunbury, "
Eckley, "	Scranton, "
Freemansburg, Pa.	South Bethlehem, Pa.
Georgetown, D. C,	Tresckow, Pa.
Honesdale, Pa.	Towsontown, Md.
Hyde Park, "	Upper Lehigh, Pa.
Hokendauqua, Pa.	White Haven, "
Hazleton, "	Wilkesbarre, "
Hellertown, "	Wilmington, Del.
Jeansville, "	Wanamie, Pa.
Kingston, "	
Lambertville, N. J.	

The following corrections in square rates should be made by offices in square 46: To squares 356, 357, 358, 359, 360 and 361, $1.50.

And the following, by offices in square 32 and the squares given below. Between square 32 and

Square 267.....	$1 50	Square 305...	$2 00
268.....	2 00	312	1 50
276.....	1 50	313.....	2 00
277.....	2 00	314.....	2 00
285	1 50	315.....	2 00
286.....	2 00	322.....	2 00
287.....	2 00	323.....	2 00
293.....	1 50	324.....	2 00
294.....	1 50	332.....	2 00
295	2 00	333	2 00
303	1 50	334.....	2 00
304.....	2 00		

On and after October first, 1873, offices in Nova Scotia and New Brunswick will check messages to or from points in Prince Edwards Island at rate of 25 and 1 for this line, and 50 and 3 for other lines.

WILLIAM ORTON,
President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Sept. 12, 1873.

On and after September 22d, Millerstown, Pa., will be added to the list of money order offices in C. O. Rowe's district.

GEO. H. MUMFORD,
Vice-President.

INFORMATION WANTED.

Information wanted as to the whereabouts of Heman S. Coats. When heard from last he was telegraphing on P. F. W. and C. Ry., under Supt. Winecoop, but he was discharged and started for Chicago. Any information will be thankfully received. His mother is greatly distressed at his continued silence.

Address letter to J. G. COATS, Union City, Randolph Co., Indiana.

BORN

CALAHAN.—At Brooklyn, N. Y., July 20, 1873, to E. A. Calahan, a daughter.

MARRIED.

BLAIRE—WAGENHALS.—At Groveport, O., Tuesday, July 15, 1873, by Rev. A. Gallagher, J. E. Blaire, of Columbus, O., to Miss Mary L. Wagenhals, of Lancaster, O.

PRATT—TUPPER.—At the residence of the bride's parents, Tuesday evening, September 2, 1873, George R. Pratt, Manager W. U. Telegraph Office, Deerfield, Ill., to Miss Lilian M. Tupper of same place.

DIED.

BROWN.—At Davenport, Iowa. August 28, 1873, Christopher H. Brown, Operator W. U. Telegraph Office, aged 20 years.

FISH.—At Oregon City, Or., August 21, 1873, Isaac P. Fish, Operator W. U. Telegraph Office, Comstock, Or., aged 21 years.

TOPPING.—At Goldsboro, N. C., in the thirtieth year of her age, Diana A., wife of Nathan B. Topping, of the W. U. Telegraph Company, formerly of 145 Broadway, New York.

TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKNOWLEDGMENT OF RECEIPTS FOR ASSESSMENTS NOS. 44, 45, AND 46, TO SEPTEMBER 11TH.

25, 143, 148, 153, 178, 185, 187, 274, 332, 414, 695, 697, 705, 1071, 1072, 1103, 1167, 1200, 1371, 1400, 1504, 1556, 1557, 1570, 1613, 1631, 1670, 1707, 1726, 1727, 1740, 1741, 1792, 1807, 1809, 1827, 1854, 1871, 1945, 1946, 1947, 1948, 1988, 1989, 1990, 2018.

ASSESSMENT NOS. 47 AND 48.

2, 6, 16, 23, 28, 37, 52, 54, 56, 60, 64, 65, 86, 88, 91, 98, 103, 104, 106, 113. 131, 138, 140, 145, 157, 175, 188, 208, 211, 215, 217, 228, 235, 269, 277, 289, 301, 302, 311, 312, 344, 346, 349, 351, 352, 371, 380, 381, 383, 405, 413, 426, 434, 459, 463, 464, 467, 478, 509, 510, 526, 542, 547, 549, 552, 554, 564, 576, 600, 604, 646, 662, 672, 703, 711, 715, 721, 731, 740, 742, 758, 769, 787, 791, 797, 815, 821, 830, 832, 858, 859, 870, 873, 874, 876, 880, 916, 917, 923, 929, 932, 943, 1013, 1024, 1028, 1038, 1039, 1046, 1056, 1061, 1081, 1085, 1088, 1099, 1143, 1148, 1151, 1154, 1169, 1173, 1174, 1178, 1188, 1198, 1199, 1207, 1228, 1232, 1245, 1248, 1252, 1254, 1257, 1259, 1260, 1267, 1271, 1300, 1304, 1306, 1329, 1336, 1356, 1357, 1398, 1409, 1429, 1452, 1489, 1516, 1517, 1518, 1519, 1527, 1535, 1550, 1555, 1560, 1568, 1580, 1589, 1590, 1635, 1650, 1678, 1683, 1695, 1708, 1735, 1636, 1739, 1742, 1809, 1813, 1862, 1869, 1881, 1894, 1906, 1919, 1960. 1957, 1971, 2019, 2020, 2021, 2026, 2027, 2028, 2029, 2032, 2035, 2036, 2037, 2043, 2049, 2065, 2069. 2070, 2076, 2083, 2097.

The continued reception of valuable letters without a signature or number of certificate continues, and it is again necessary to caution members making remittances to be careful not only in these respects, but also to note that their letters are properly stamped before mailing, otherwise they are sent to the Dead Letter Department at Washington, and only reach their destination after a long delay, if fortunate enough to come at all.

It is incredible that among so intelligent a class of the community as is represented in our membership that so much carelessness should exist, nevertheless such is the case. Scarcely a week passes but that we are compelled to trace a letter back to its source, with no other guide than the post mark. This is often unreliable, in consequence of being illegible, and our only alternative is to pay the money over to the credit of the reserve fund.

The printed envelopes, doubtless, prevent many letters going astray. Previous to their use much carelessness was developed in addressing letters, many of which were in due time returned to the senders from Washington, whilst the bulk of them were never heard from. We are firmly convinced that thoughtlessness on the part of the sender is the cause why so many letters never reach their destination.

The annual meeting in November is expected to be of unusual importance. A new Treasurer, Secretary, and Executive Committee will be elected, and it is very desirable that the whole body of members should have a voice in the election of their officers, as well as in the other deliberations of the meeting. In consequence of the frequency of deaths during the past year (which have reached fifteen for the ten months), there is an earnest demand from two or three districts for the adoption of some plan whereby the expense of a membership with us will be lessened.

Many members are in receipt of small salaries, and cannot afford to pay the double and triple assessments which have been made so often, and they very properly demand that something should be done to relieve them of the burden. Two schemes were proposed to accomplish this object, one was to divide the membership into classes of 500 each, designate each class as A, B, and C, and to give a member the option of belonging to one class or all. The other plan was to limit payments in case of each death to $1,000, the excess paid in on any assessment to be credited to the reserve fund, which, in due time, would be drawn upon to pay a death claim, instead of assessing the members for the same. The first plan was open to the objection that it would involve too much clerical labor, and be too complicated. The second was simple, would cause no additional work in keeping the books, and it was thought that $1,000 was as great a sum as such an institutions as ours should undertake to pay at any one time. An expression of opinion of the members in general on the expediencey of adopting this latter plan was solicited. Much to the surprise of the officers it met with considerable opposition which could only be accounted for on the ground that the proposition was not thoroughly understood, and while doubtless a clear majority were in its favor, yet it thought best, in difference to the opinions of the minority to postpone the whole subject until the annual meeting. The association has grown so large, and the labor connected with keeping the books and corresponding with members has increased so greatly within the past two years, that some provision should be made for remunerating in a suitable manner, those upon whom the work, shall hereafter fall. The present officers cannot, under any circumstances serve another year on account of other duties, and it becomes a serious question to determine what arrangements shall be made for the future.

In view of these important considerations it is hoped as many as possible of the members, and especially of the agents, will be present at the annual meeting in New York on Wednesday, the 5th of November.

FOREIGN TELEGRAPHIC ITEMS

THE VICTORIA, AUSTRALIA, TELEGRAPHS.

From the returns of the telegraph department of the post-office of the colony of Victoria, Australia, it appears that there was an increase in 1872 of nearly 17 per cent. in the Victoria private messages, over the number transmitted in 1871, and an increase of 14 per cent. in the intercolonial messages.

The total number of messages transmitted over the Victoria lines in 1869, the year before the reduction of the rates, was 277,132, and the gross revenue, £34,183. The total number transmitted over the lines in 1872, the third year after the reduction of the rates, was 639,960, and the gross revenue £42,617. This large increase of business was doubtless almost entirely due to the reduction of the rates. Under the lower rates, and the consequent increase of business, the working force was necessarily augmented, which involved a large additional outlay, but it appears that this has resulted in a net gain to the department, as well as an advantage to the public. Against an estimated additional outlay, up to the end of 1872, of £7,250, there was a net increase of £8,434 in that year's receipts, and the number of messages has much more than doubled since the reduction of rates.

In 1854 the cash revenue was £223, the charge for Government messages £1,037, the number of Government messages 1,570 and the total number of messages 3,864. In 1872 the cash revenue had increased to £42,617, the charge for Government messages £7,029, the number of Government messages 85.645, and the total number of messages 639,960. A large addition was made to the business of the department towards the end of 1872, by the opening up of telegraphic communication with Europe and the East. To this the Report on the Post-Office and Telegraphic Department thus refers: "On the 21st of October, 1872, direct telegraphic communication was established by way of Port Darwin, and, with the exception of a few interruptions of short duration on the overland line, the communication has been satisfactorily maintained." After alluding to some other matters closely connected with this, the report adds: "Judging from the number of messages which have passed over the British and Australian lines up to the end of the year, the value of the Australian business may be set down at about £80,000 per annum, nearly one-half of which is contributed by Victoria." This is verified by a statement appended to the report, in which it is shown that out of the total of 1,851 messages received and transmitted for the last two months and a little better of 1872, 954, or rather more than one-half belonged to Victoria; and that out of the gross sum of £19,214 paid for these messages, Victoria contributed £9,770, or, in like manner, rather more than one-half.

THE WESTERN AND BRAZIL TELEGRAPH COMPANY.

The second section of the cables connecting Pernambuco with Bahia and Rio Janeiro will be ready for shipment on return of the steamship Hooper from the present expedition, and it is anticipated that both sections will be laid in working order before the end of the year.—*The Money Market Review*, *Aug.* 9.

THE INDO-EUROPEAN TELEGRAPH COMPANY.—Time occupied by messages in transmission from England to India, *via* Teheran:—For the week ending 22nd August, 1873: longest time taken by any message, 4 hours 10 min.; shortest time taken by any message, 17 min.; average time of all messages, 1 hour 32 min.

At the recent statutory meeting of the Eastern Extension, Australasia and China Telegraph Company, Limited, the directors' report, which was adopted, showed the gross receipts from the 1st January to the 30th June, 1873, to have amounted to £105,245; and stated that an interim dividend of 3s. per share for the quarter ending March had been paid. It was mentioned that the amalgamation had been successfully carried out without a dissent, and that, with the exception of about 1,200, the whole of the shares in the British Indian Extension Submarine and British Australian Telegraph Company, Limited, have been exchanged for new shares in the Company.

The Eastern Telegraph Company's traffic receipts for the month of July amounted to £28,975, and to £29,565 in the corresponding period of 1872.

In his Monthly Circular Mr. William Abbott says:—"The announcement that the Peruvian Government have offered to guarantee 5 per cent. upon the necessary capital for a cable to connect Peru with Panama, is most important at the present juncture, as it will no doubt lead to an early submerging of a cable that will at once become a very valuable auxiliary to the West India system.

The following is a statement showing the total number of messages forwarded from postal telegraph stations in the United Kingdom during the week ended the 23rd of August, 1873, and during the corresponding week of 1872:—Week ended August 23, 1873, 365,484 messages; week ended August 24, 1872, 329,201; increase in the week of 1873 on that of 1872, 36,283.

The telegraph cable which was laid between Kingston and Aspinwall, and twice lost, has again been recovered.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, SEPTEMBER 15, 1873.

MINISTER SCHENCK AGAIN.

It does appear as though that "American gentleman residing in Paris" had changed his domicile to London. Some one of about the calibre of that famous person evidently has been playing upon Minister Schenck's finer feelings—his well-known hatred of corruption—and so aroused that irascible diplomat that he has been provoked into an onslaught upon the Atlantic Cable and the Western Union Companies, which has resulted in his grievous discomfiture. His ignorance concerning the charges which he brought against the companies, and the animus by which he was actuated, was so thoroughly exposed by President Orton that but few expected a rejoinder. However, one came, bearing evidence of a mind greatly disturbed, reiterating a portion of his former charges, for the correctness of which he now calls upon Mr. Orton to furnish proof.

The closing portion of the letter is interesting only so far as to show what a man will say when he loses his case and his temper.

Who is using this unfortunate gentleman to draw chestnuts out of the fire?

THE DUPLEX [illegible] SUCCESSFULLY APPLIED TO SUBMARINE [illegible]

The applicability of the Duplex system to ocean cable service, has been successfully demonstrated by the Eastern Telegraph Company, who are now working it upon the sections of their cables between Lisbon and Gibraltar, (330 miles), and Malta and Alexandria, (950 miles).

As soon as the necessary instruments can be obtained, the electricians, profiting by the experience they have acquired on the shorter cables, fully expect to be able to apply the system also successfully to the longer sections between Malta and Gibraltar, (1120 miles), between Suez and Aden, (1450 miles), and between Aden and Bombay, (1820 miles). It is impossible to overrate the importance of these improvements, for, when perfected, they practically at once double the carrying capacity of all existing submarine cables, a fact which must have considerable influence upon their value as paying investments.

AIMLESS EDUCATION.

In a recent issue, in commenting upon the aimless character of the education of our youth at the public schools, we took occasion to place before our readers and those who controlled the course of studies pursued at the educational institutions, the propriety of teaching some useful business pursuit which would prove beneficial to the scholar in after life, and instanced chiefly, the business of the telegraph. Since that article appeared, a number of newspapers in different sections of the country have taken up the subject, and, in a general manner, while not recommending any particular course, point out the necessity of giving aim to education. The commencement of the scholastic year is an appropriate time to urge upon those in authority the necessity of consideration and of action.

What is needed in our public and private schools, is not so much a cramming of the student with knowledge utterly useless to him in fighting the battle of life, as to furnish weapons calculated to render him independent and contented. Notwithstanding the fact, that teachers as a class, resist the idea of fitting the scholar for life duty, as the proper end of their vocation, nothing is more true than that this should be the end aimed at. Such a reform is urgently needed, and in carrying it out, our school boards and teachers will realize that their work will result in the permanent welfare of those committed to their care, in a much greater degree than is possible from the course now pursued.

The telegraph service is in need of many operators of this intelligent class, and the necessity grows stronger daily with the expansion of the lines. Good telegraph operators are a public necessity, and in supplying them, the school managers would directly benefit the public, the scholar, and the telegraph companies.

In adopting this and kindred expedients for keeping to the prime end—education as a fitting for life work,—we are confident that the various burdens of society would be greatly reduced, crime and pauperism be checked, and the people saved a large portion of the money they are now forced to waste on the [illegible] and the vicious—in many cases made so from discontent, or a [illegible] opportunity to earn an honest livelihood in the sphere to which [illegible] have been educated.

THE INDUSTRIAL EXPOSITION AT CINCINNATI.—The fourth Industrial Exposition opened at Cincinnati, on Wednesday, 3d instant. These Expositions are far more successful and satisfactory than any which have taken place in the United States, and this one more interesting than any preceding. No less than twenty-three premiums for electrical and telegraph apparatus are offered, and the display in this line is unusally fine. The Exposition will continue open until Saturday, October 4th.

Mr. George H. Grace has been appointed General Superintendent of the Southern and Atlantic Telegraph Company's lines, with head-quarters at Macon, Ga.

THEN AND NOW.

We read a few days ago, in a reprint of the original *Maryland Journal and Baltimore Advertiser*, an account of the difficulties encountered in establishing a weekly newspaper in Baltimore, the first copy of which was issued just one hundred years ago last month. The employment of a "post rider" between Baltimore and Philadelphia, was referred to as one of the serious items of expense. He was to set out from Philadelphia early Monday morning, and was expected to reach Baltimore Tuesday evening, and to bring the "freshest advices," (from one to four weeks old), from New York and Boston, and sometimes to bring information from Europe, which occasionally arrived in the royal mails. While reading this quaintly expressed editorial article a century old, a memorandum was handed to us, the substance of which we give below, and which strikingly illustrates the difference between then and now:

Not long since, a gentleman called at the Western Union Telegraph Company's principal office in New York, to forward a message to St. John, N B., eight hundred miles distant. The message was forwarded to St. John, and the answer procured and delivered to the sender of the first message in New York, in twenty-two minutes.

A lady called at the same office a few mornings ago, to forward a message to Bradford, an interior town in England, remarking that she would wait for the answer; and in three hours and thirty five minutes, the desired reply was safely delivered to her.

While it is not customary for correspondents to wait in our offices for replies from Europe, it frequently happens that they are returned within an hour, and sometimes in forty minutes.

Verily this is an age of progress.

THE LISBON AND RIO JANEIRO CABLE.

The work of laying a cable between Portugal and Brazil, was commenced on the 21st ultimo. On the 26th, after paying out over 400 miles of cable, the expedition was stopped by the discovery of a fault in the wire. From tests which were made, it is believed that the fault is near the land. It was decided to continue paying out the cable until Madeira was reached, whence the cable steamer will probably have to return to repair the fault.

Later advices state that the cable is broken at a point 180 miles from Madeira.

RETURN OF MR. W. H. ABEL.

Mr. W. H. Abel, for many years Auditor of the Western Union Telegraph Company, who went abroad last Autumn for his health, arrived here by the Steamer Nevada, on the 2d instant, and was warmly welcomed at the Quarantine by a large concourse of his friends, who went down the Bay in a steamer, especially engaged for this purpose, and brought him to the city. Mr. Abel spent the Winter in the south of France and Italy, and the Summer in Switzerland, and has returned considerably improved in voice and general health, but is not sufficiently restored to warrant his return to active business at present.

Mr. Abel desires, through the JOURNAL, to grasp the hands of his old friends and associates, and to express his great pleasure at being once more in their midst.

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THE NEW OFFICE OF THE WESTERN UNION TELEGRAPH CO. IN OMAHA.

The Western Union Telegraph Company recently opened a new office at Omaha, in the Grand Central Hotel. The office, with all its appointments, is without doubt the handsomest and most complete for its size of any in this country. For the following particulars we are indebted to the *Bee*. Upon entering the door, one is confronted by an elegant counter, surmounted by a ground glass partition, in which are a couple of apertures and writing desks at which the business with the office is transacted. At the left are the manager's desk and safe, upon a platform, surrounded by a railing. Behind the counter are five beautifully finished tables, made of ash, with black walnut mouldings. The first table is fitted up for seven instruments, one pair of button repeaters, and one set of the latest automatic repeaters, called the "Milliken-Hicks." Each of the other four tables are supplied with four instruments each, making in all twenty-three instruments. Each table is divided into four compartments by glass partitions, and furnished with an Argand gas burner, which comes up through the centre. The switch board is of the very latest manufacture, and is from the shop of Mr. Henning, of Ottawa, Illinois. It is fitted for thirty-two wires, and is composed of 2,000 pieces of brass. Fourteen wires are now worked out of this office. The batteries are in the basement, and consist of sixty cups of Grove main battery, and forty cups of Gravity local battery.

The office is perfect in all its details, nothing having been forgotten to make it second to none. It presents a handsome and comfortable appearance, and the gentlemen connected with the office have good reason to feel proud of their new quarters. The superintendent of the Western division is Mr. W. B. Hibbard, whose headquarters are now at Salt Lake. Mr. Frank Lehmer is the manager of the Omaha office, and Mr. William Lehmer cashier. There are five day and three night operators, Mr. F. B. Knight being the chief operator.

THE SURVEY FOR A SUBMARINE CABLE BETWEEN THE UNITED STATES AND JAPAN.

Commander George E. Belknap, commanding the United States steamer Tuscarora, reports to the Navy Department, under date of August 30, that he expected to proceed to sea from San Francisco on September 2, on the special service of surveying a route for a submarine cable from the west coast of the United States to China and Japan. The survey will commence from some point in the vicinity of Puget Sound. From that place the Tuscarora will proceed to the Aleutian Islands, and it is expected she will reach the island of Atcha. It is not probable that much progress will be made in the survey this season, as the weather will soon be unfavorable for it. In that case the vessel will be employed until Spring in getting the continental outline between San Francisco and the end of the California Peninsula, sounding off and on shore until she ascertains the true ocean bed. An experience will thus be obtained which will enable her to execute her orders with more certainty. An official report from Commander Belknap states that he has a new sounding apparatus, made on the plan of Sir William Thompson's, and he has no doubt of the success of the survey. At Puget's Sound he will first ascertain the most favorable spot to land the cable, his efforts being to secure one where the water is deepest and where vessels do not anchor.

OBITUARY.

SIR FRANCIS RONALDS, F. R. S.

The English journals record the occurrence of the death of Sir Francis Ronalds, F. R. S., the eminent scientist, at his residence, St Mary's Villa, Battle, Sussex. He expired in the eighty-sixth year of his age.

Born in the year 1787 or early in 1788, the son of a plain gentlemen, at Highbury, and brought up at a school in Hertfordshire, where both mathematics and the physical sciences were taught, he began early to devote himself to the theoretic study of those subjects in the practical application of which, at a subsequent date, he rose to such eminence. It was as nearly as possible sixty years ago—namely, in 1813 or 1814—that having made the acquaintance of M. De Luc, a French savant, then engaged in a series of electrical experiments, he became so interested in the subject that he resolved to turn his attention to electricity as the serious business of life. The researches which he made with the view of ascertaining the degrees of quantity and electricity in the electric pile and his invention of a clock to be kept in motion by electro-galvanic power were described severel years ago in the pages of the *Philosophical Magazine*. Mr. Ronalds also, it is said, was bold enough, in 1816, to propose the laying down of one of his electric telegraphs between St. James' Palace and Brighton, which at that time was the usual residence of the Prince Regent, but was snubbed by a red tape reply from Lord Melville and his brother Lords of the Admiralty, to the effect that the telegraph already in use—viz., the clumsy wooden apparatus that till lately surmounted that department in Whitehall—was quite sufficient for any existing requirements, and that no new one was wanted. And so the electric telegraph was "shelved" for a time, being destined to lie dormant until again it should be woke up into action, or the nation woke up to appreciate it, by the conjoined labors of Cooke and Wheatstone. It should, in justice to Sir Francis Ronalds, be mentioned here that a pamphlet which he gave to the world as far back as the year 1823 contained full accounts not only of his electric telegraph, but of an improved electric machine, of a new mode of electric insulation, of an electrograph for recording electro changes, and a pendulum doubler for the induction of a continued flow of electricity, together with his attempt to apply M. De Luc's column to the measurement of time, and his experimental observations on Mount Vesuvius and in Sicily. In 1825 he invented a perspective tracing instrument to facilitate drawing from nature or from plains and elevations. This machine was employed by him and Dr. Blair ten years afterwards, in order to procure exact perspective projections of the Celtic remains in Brittany. In 1843 he was appointed the first (honorary) director of the observatory at Kew Gardens, and the duties of this post he discharged with great zeal and energy down to 1852, when he retired, obtaining at the same time a well-merited pension on the Civil List. Several years before this he had been elected a fellow of the Royal Society, in acknowledgement of his applications of electrical science; but it was not until 1870 that the man whose labors in telegraphic investigation, as stated in his patent, had been alike "early" and "remarkable," received that small honor of knighthood. It only remains to add that to his ingenuity are due several great improvements in instruments and methods of testing and recording the natural phenomena, the atmospheric electric conductor, the photo-barograph, the photo-thermograph, the photo-electrograph, and the photo-magnetograph—all varied applications of one and the same discovery. He described all these various instruments in the reports and transactions of different learned societies, and we believe that his atmospheric electro conductor has been adopted in the observatories of Greenwich, Madrid and Bombay, while his photo-baragraph and photo-thermograph are in use at the Radcliffe Observatory at Oxford. In 1845 he received a government reward for his invention of photographic self-registering meteorological and magnetical instruments.

A FISH STORY—NEW DIFFICULTY FOR SUBMARINE TELEGRAPHS.

A correspondent of the London *Times*, in a communication published in that paper of the 12th ulto., narrates the following incident, which developes a new and hitherto unexpected danger to submarine telegraph cables. The communication is dated Kurrachee, July 8, and is signed H. Izaak Walton:

"As the following incident relating to submarine telegraphy may interest a large portion of your readers, I send you the account, in the hope that you may think it worthy of publication in *The Times*.

"The cable between Kurrachee and Gwadur (a distance of about three hundred miles) suddenly failed on the evening of the 4th instant. The telegraph steamer Amber Witch, under command of Captain Bishop (late I. N.), with the electrical and engineering staff under Mr. Henry Mance, proceeded on the following day to repair the damage, which by tests taken at either end appeared to be one hundred and eighteen miles from Kurrachee. The Amber Witch arrived on the ground at 2 P. M. on the 6th, a heavy sea and thick fog prevailing at the time, but the cable was successfully grappled within a quarter of a mile of the fault.

"The soundings at the fault were very irregular, with over-falls from thirty to seventy fathoms. On winding in the cable unusual resistance was experienced, as if it were foul of rocks, but after persevering for some time the body of an immense whale, entangled in the cable, was brought to the surface, when it was found to be firmly secured by two and a half turns of the cable immediately above the tail. Sharks and other fish had partially eaten the body, which was rapidly decomposing, the jaws falling away on reaching the surface. The tail, which measured fully twelve feet across, was perfect, and covered with barnacles at the extremities. The sea being too rough at the time to make use of the boats, an attempt was made to haul the whale on board, but its own weight broke it away from the injured cable as soon as it was raised above the surface.

"Apparently the whale was, at the time of entanglement, using the cable to free itself from parasites, such as barnacles, which annoy them very much, and the cable, hanging in a loop over a submarine precipice, he probably, with a fillip of his tail, twisted it round him, and thus come to an untimely end.

"During the time the Amber Witch remained on the ground a large school of whales continued to play in the close vicinity of the ship, frequently blowing within a dozen yards of the vessel, and even rubbing themselves against the hawser by which the ship was secured.

"As the officers were engaged in repairing the late fault, and the boatmen who accompanied me in 1862 are all accessible, I must refer any skeptical readers to them for corroboration of my statement."

Mr. JOSEPH ANGELL, late chief operator in the Erie Railway office in New York, has been appointed Superintendent of Telegraph on the New York & Oswego Midland Railroad.

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A REMINISCENCE.

One evening, not in eighteen hundred and blank, but plain 1855, the subscriber, then an adolescent plug of some fifteen Summers, arrived at the village of E——, away down South, to assume the position of assistant operator in the telegraph office there. The last lingering rays of the sun were not gilding the western horizon half as effectually as they were performing that operation for the end of my nose. Within a few hours after my arrival, I had reported for duty to the manager, Col. G——, who was also a lawyer and politician of note, and was duly installed. So far as I know, no "unabridged" has ever defined the meaning of "assistant" or "cub." It appeared in those days to be one of the most comprehensive terms in the language. It included the duties of operator, clerk, book-keeper, receiver, manager, messenger, battery-man, line repairer, janitor, and all others connected directly or indirectly with an office like E——. Having shown me into the office and battery-room, the Colonel promptly washed his hands of the whole concern, and went off to attend to his law practice and political affairs, leaving me entirely to my own reflections and devices, which were various. They included sundry original methods of performing the duties of the office, some of which I have never seen practised since. The Colonel's salary was forty dollars per month, whereof he bestowed twenty on me, and made the other twenty clear of expense and trouble. As board and washing cost but $9.25 per month at E——, I had a pretty large proportionate margin left for other expenses and profit.

The office at E—— presented a far more useful than ornamental appearance. In surveying the solitary, unpainted operating table; the old-fashioned dirty instruments, with an avalanche of ribbon paper tumbling into a huge box; the straggling, uninsulated office wires; the battery-room, with tables and floors disintegrated by acids; the cobwebs and dust that liberally bespread everything in sight: no one would have acquired the smallest idea of the neat and trim W. U. office of these latter days. Nevertheless, I felt very happy and independent in my new premises. There was but one misgiving in my mind. I felt that I could "run" the office pretty well; but there remained the question of repairing, with the disquieting adjunct of climbing. Of this latter, I was compelled to confess to myself entire ignorance and a general horror. I remembered watching one day,—several years before my advent into telegraphy,—an awkward chap trying to make his way up a pole. This genius adopted the plan of putting out both his climber points at once, making at the same time a grab at the blue heavens above, with the legitimate result. As I had no reason to doubt that he was a properly educated repairer, I had nearly reached the conclusion that the whole climbing system was a "fraud." In this state of mind, for the first few days after my arrival at E——, I watched every threatening cloud with secret apprehension, for I knew that almost every storm laid trees across the wires in the heavily timbered country through which they ran. But relief was near. Before the clouds had made up their minds to go into that sort of criminal proceeding, Jabe J—— called and introduced himself. Jabe had been my predecessor as cub, but, after some months' trial, the mysteries of Morse had proved too deep for him, and he had abandoned them for the less complicated business of clerking in a country store. He was about my own age, sandy-haired, and had a bold countenance, in which freckles and tobacco juice had a considerable struggle. He wore no coat, and but one suspender,—which, however, was of a bright copperas color,—and was possessed altogether of a striking air of independence and assurance. His true name was probably Jabez, but Jabe was what he was called. A few hours made us quite intimate. He confidentially informed me of his dislike of the key, and I admitted my ignorance and apprehensions of the climbers. But together we made up a sort of compensation-balance system. He claimed to be "nearly lightning" on climbing, whilst I treated of reading by sound as a trivial matter. So we made a mutual compact—I to teach him to operate, he to initiate me into the art of getting up and down big trees without damaging myself. I say trees, because there were no poles except through the streets of towns, and farms and "clearings" in the country. We were shortly afforded an opportunity of putting Jabe's part of the agreement into practical operation. A thunder-storm swept over the line one night, and the only fluid I could taste from towards P—— next morning was in the shape of a parting shock of lightning, which came very near knocking me off the tall three-legged office stool. After postponing the inevitable as long as possible, I summoned Jabe, and gathering up the tools, wire, and other repairing paraphernalia, we started "out on the line." About 15 miles jaunt through the wilderness brought us to the scene of disaster. A tree had fallen across the line, and the broken wire had slipped out of an insulator, fastened some twenty-five feet up a large oak. After considerable difficulty and perspiration, we got the wire drawn together and spliced, and it remained only to replace it in the glass. Jabe became taciturn. After a long rest, he buckled on the climbers, with an air of solemnity befitting so important a matter, and a deliberation that set the sun several feet further westward. Finally there was no longer a strap, or a buckle-tongue remaining unadjusted, nor any other sufficient reason why the climbing should not begin, and after fastening an end of the pulley rope to the strap of his trowsers behind, Jabe began it. So far from the violent gymnastics of the other man I had seen climbing, Jabe went slowly, up, trying each place he thrust the climber-points into, two or three times, with violent kicks and a corresponding number of grunts; his legs far apart, and his long rope tail uncoiling slowly behind him. About 15 feet up, he remarked between grunts: "These cussed climbers never did fit me nohow." I replied to the effect that there did seem to be something wrong about them. This was all the conversation that took place while he was going up. Arriving at the bracket, he seemed to have made up his mind not to stop there. It was probably not a very interesting place. Anyway Jabe crept on, until he reached a large limb above the bracket, astride of which he seated himself, and proceeded to puff and blow, and to hold on very tightly. I said to myself, "this is skill, it is science; he went up that extra distance, just to show me he wasn't afraid to climb even higher than necessary. Jabe is a first-class repairer; but the work looks so hard that I believe I'll resign. Afterwhile Jabe recovered his breath sufficiently to pull the wire up, by the pulley rope, which I had made fast to it below, and a little awkwardly I thought, succeeded in droping it into the glass below him. As the line was O K now, and it was getting late in the day, I busied myself with collecting the tools and preparing for our start homeward. Some time elapsed before I had everything ready, when, looking up, to my surprise I beheld Jabe still ensconsed on the limb. I at once urged him to come down, as we had no time to spare. He said, "These durned climbers never were any account." This seemed aside from the main point, and I simply repeated my previous observations. Then Jabe said: "This tree has got the meanest bark I ever saw." I made no attempt to combat this proposition, seeing that the tree did have a rough exterior, but contented myself with warning him that we would be in the night getting home, if he didn't come down at once. Perceiving the correctness of my view upon this matter, he put one of his feet down a few inches, and gave a feeble kick, which failed to strike his climber well into the tree, and it consequently slipped out, the moment his weight partially rested on it; whereupon he hastly scrambled back to the limb, and observed with a degree of feeling, that he wished I would go up to old Mr. Jones—some five miles off—and borrow a ladder to get him down with. For the first time I had a misgiving of Jake. I told him it would take until late at night to do that, even if Jones had a ladder, which was improbable; and hazarded the opinion that as he had gone *up* the tree, he could certainly come *down* it. Upon this he informed me, that coming down was a "dog goned sight" harder than going up; and that he wouldn't come down until I got a ladder for him. We were both getting a little excited, and I wound up the discussion by notifying him, that if he didn't come down at once, I would drive off, and leave him to stay up there all night, and as much longer as might suit his convenience. At this Jabe began to cry, and call names; and when I actually drove off a few yards to stir him up, he increased the cry to a howl, and started down the tree. His start was slow and painfully laborious, but after descending a short distance, he must have changed his mind, for he suddenly seemed to let go all hold and came down "by the run." Bark, skin, and clothing flew, and when he raised himself up from the foot of the tree and started towards me, he presented a curious aspect, and was mad about something. "In the scene that ensued," I *did* take a hand, but might as well draw a veil over it. The compact was broken.

J. S. B.

PRIZES FOR ELECTRICAL SUBJECTS OFFERED BY THE SOCIETY OF ARTS.—Among the general prizes of gold and silver medals offered by the Society of Arts are the following:—

A Galvanic Element which shall combine the constancy of the Daniell's cell with the low resistance and high electromotive force of a Grove's cell.

An Electric Condenser which shall combine high capacity with small bulk, and small residual charge.

A Sensative Pocket Galvanometer.—The size should not exceed that of a watch.

To which may be added, as of use in telegraphy,—

A Varnish or coating which can be applied to iron wires so as to protect them against rust, and which shall not be liable to chip off when the wire is bent or rubbed.

Electric Weaving.—To the manufacturer who first practically applies electricity to the production commercially of figured fabrics in the loom.

Telegraphs.—For an economic and permanent means of telegraphing through uninsulated wires, between places not less than 1000 miles apart.

Patented inventions are not excluded from receiving the Society's rewards. The Council reserve to themselves the right of withholding all or any of the above medals or premiums, as the judges may report. The Council is willing to receive communications on subjects not included in the above list, The degree of originality and value of suggested improvements will have material influence on the adjudication of the award. In all cases a full account and description of the invention for which a medal or premium is sought must be sent to the Society. All communi-

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cations must be written on foolscap paper, on one side only, with an inch and a quarter margin: they must be accompanied by such drawings, models, or specimens, as may be necessary to illustrate the subject. The drawings should be on a sufficiently large scale to be seen from a distance when suspended on the walls of a meeting-room. All communications and articles intended for competition must be delivered, addressed to the Secretary, at the Society's House, free of expense either on or before the 31st December, 1873 or 1874, except where otherwise stated. In the first case they will be considered during the Session 1873-4; in the second case during the Session 1874-5. Any communication rewarded by the Society, or any paper read at an ordinary meeting, will be considered as the property of the Society. Should the Council delay its publication beyond twelve months after the date of its being rewarded or read, the author will be permitted to take a copy of the same, and to publish it in any way he thinks fit.

RESISTANCE OF WIRES.

(*From the Telegraphic Journal.*)

By JAMES GRAVES.

In a foot-note on page 22 of No 11 of the TELEGRAPHIC JOURNAL, it is stated that "it is open to future investigation to determine whether a body which offers a unit of resistance to one cell, offers neither more nor less than a unit of resistance to a hundred cells."

Since reading this I have accurately adjusted two separate ohms of No. 20 German silver wire, and used them as a Wheatstone's bridge.

As a first experiment I put on the third side of the parallelogram a resistance of four-hundredths of a Varley unit (0·04 V. U.), and on the remaining side 1·1 ohm by Varley. These exactly balanced each other with 1 cell, 50 cells, and then 1 cell again, not a shadow of difference being observed on the galvanometer, which was a very delicate astatic mirror, whose resistance was 5854 ohms.

Secondly, I increase the resistance on the third side to 0·81 V. U which exactly balanced 20·6 ohms, and this arrangement gave the same result with 1 as with 50 cells.

As the resistance of the galvanometer, being very high in comparison with the four branches of the parallelogram, might account for this result, I prepared a mirror galvanometer, bound with 4 yards of No. 16 copper wire, having a resistance of about six-hundredths (0.06) of an ohm.

With the same bridge of equal ohms, I took a length of 30 inches of No. 18 copper wire for the third and fourth sides, and following the bridge round I found a spot at which the balance was perfect; the addition of one-tenth of an inch either side of this spot gave a perceptible deflection. I then measured the length of the two halves, and found them exactly 15 inches each between the points of contact. With 1 cell or with 15 cells the result was precisely the same. Two sides of this parallelogram were of German silver and two of copper; they would therefore be equally affected thermally.

In another experiment I used the same bridge and galvanometer. On the third side I placed ¼ an ohm of German silver, and on the fourth side a length of No. 24 copper wire, sufficient to make a perfect balance with momentary battery contacts. This gave the same result with 1 as with 50 cells, alternated three times with an interval between.

With this same arrangement, 1 cell in permanent contact three minutes showed no alteration; 50 cells on three minutes gave evidence of slight motion, which, by making and breaking, could be increased to an oscillation in the direction of an increase in the copper side, showing the unequal effects of heating. Practically, as far as these experiments show, a standard unit of resistence remains the same for low as well as for high power.

Valentia, December 19, 1872.

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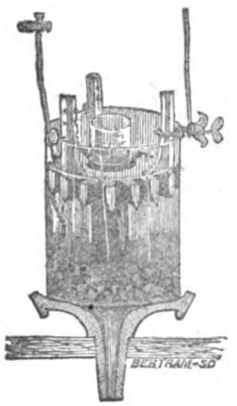
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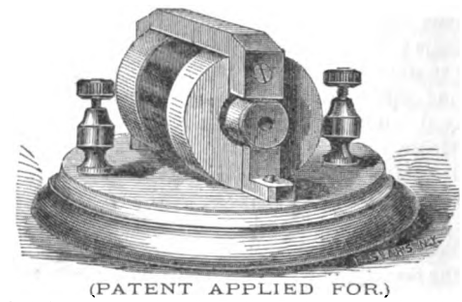
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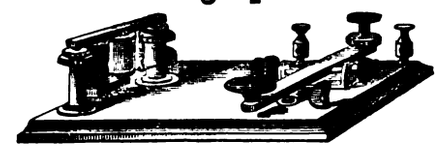
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 21. NEW YORK, OCTOBER 1, 1873. WHOLE NO. 142.

MEASUREMENT OF ELECTRO-MOTIVE FORCES.

Until some recognized standard of electro-motive force is adopted, this measure can only be given in terms of the force of some other battery. Its measurement may be obtained on two systems—either by the application of Ohm's law to a battery in action, where the resistances are known, or by allowing the battery to remain inactive, and measuring the tension, in which cases the tension is the same as the electro-motive force, and the resistances in circuit need not be known. The first five of the following methods belong to the former system, and Poggendorff's method is a combination of both.

To compare the electro-motive forces of two batteries:

1. Let their force be E and E'; join them up successively in circuit with the same galvanometer, and, by varying their resistance, cause them both to give the same deflection; their forces will then be in direct proportion to the total resistances in circuit in each case, or

$$E' = E \times \frac{R'}{R}$$

where R represents the resistance with E (including that of battery, galvanometer, and the variable resistance), and R' with E'.

2. If the external resistances be made very large indeed in comparison with that of the cells themselves, their internal resistance may often in practice be neglected, and only those of the galvanometer and resistance coil taken into account.

3. Where the electro-motive forces differ greatly it is often necessary to employ a shunt to diminish the deflection of the galvanometer and bring it within range with the more powerful battery. Calling their resistances g and s, their point of resistance will be

$$\frac{g \times s}{g + s}$$

which must be employed in calculating the total resistance of R; the respective electro-motive forces are then

$$E' = E \times \frac{R \times \frac{g+s}{s}}{R' + g}$$

4. Where shunts are used in obtaining both the deflections, the formula becomes

$$E' = E \times \frac{R \times \frac{g+s}{s}}{R' \times \frac{g+s'}{s'}}$$

In all these cases $\frac{g+s}{s}$ represents the multiplying power of the shunt.

5. When a Thomson's reflecting galvanometer is employed (or any other in which the deflections have a known value), it becomes unnecessary to reproduce the same deflection. Calling the deflections d and d', we have:

$$E' = E \times \frac{R \times d}{R' \times d'}$$

6. *By the direct opposition of cells.*—Where a number of cells are joined up in a circuit with, but in opposition to, a number of other cells with a galvanometer inserted, and the numbers adjusted so that no current passes, we have an obvious measure of their electro-motive force.

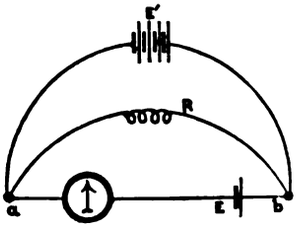


Figure 1.

7. *By Poggendorff's method.*—In this method (Fig. 1) the more powerful battery, E', is joined up in circuit with a resistance coil R, and the other battery E and a galvanometer are connected to the same coil, so that both batteries send a current through R in the same direction; by increasing the resistance of R it is easy either to make the current of E' overpower that of E, or to obtain such an equilibrium that E' shall remain inactive, and no current pass through the galvanometer in either direction. When this is effected we have the following ratio: as the total resistance of E' and R is to the resistance of R so is the electro-motive force of E, or

$$E = E' \times \frac{R}{E' + R}$$

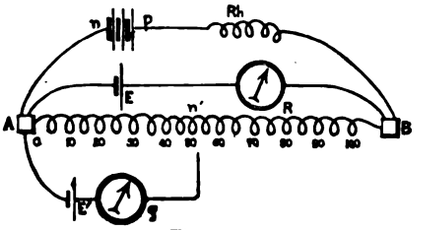


Figure 2.

8. *By Clark's Potentiometer.*—It has been objected to the preceding system, that since one of the batteries is active and the other not we do not obtain a true comparison of the forces. Although attaching little importance to this objection, the author has for many years past employed an instrument depending on similar principles to which this consideration does not apply.

R is a coil of platinum wire of 100 turns, wound on an ebonite cylinder, which revolves on its axis like a Wheatone's rheostat; the ends of the coil are connected to the axles, which work in the blocks A and B; $p\ n$ is a battery of several cells, also connected to the blocks A and B, which sends a continuous current through R. A rheostat, Rh, is also inserted, by which the total resistance of the circuit can be varied. E is a standard element (or a thermo-electric pile), also connected to the blocks A and B with an intervening galvanometer, which, by a proper adjustment of the rheostat, is just balanced by the battery $p\ n$ in the manner before described, so that no current passes. Thus far the arrangement is similar to that of Poggendorff, except that E is used as the standard of comparison instead of $p\ n$. E' is the cell whose tension or electro-motive force we desire to measure, and this is connected with the block A and galvanometer g, and a moveable wire n which can be applied to any part of the wire R.

Assuming the standard battery E to be exactly balanced by $p\ n$ and to have a tension of 100, and calling the tension at $A = 0$, we have between A and B every tension from 0 to 100; and by applying the wire n successively to different parts of the wire R we soon find a point where the tension of E is balanced, no current passing through g. A scale of equal parts measured along R gives the tension of the cell E' by simple inspection.

By the use of a Thomson's galvanometer, and by fixing a divided scale on the revolving cylinder, it is easy to measure tensions accurately to the ten-thousandth or hundred-thousandth part of a Daniell's cell. When the battery E' which we wish to measure is more powerful than the standard battery E, their positions are reversed and E is connected to the galvanometer g and wire n. When this is the case, employing a scale of 100 parts and calling n the number of divisions, we have

$$E = E \times \frac{100}{n}$$

Table giving approximately the electro-motive force of different batteries.

Grove's	100
Bunsen's	98
Leclanché	75
Daniell's	56
Smee's (not in action)	57
Smee's (in action) about	25
Copper and zinc in acid (Woolaston's)	46
Sulphate mercury and graphite (Marie Davy)	76
Chloride silver	62
Chloride lead	30

The foregoing determinations are the mean of a great many observations by the author, and give the electro-motive force of the battery as taken on a sine galvanometer. When connected on short circuit the electro-motive force of several of the batteries,

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and especially the Smee and Woolaston's, will fall off 50 per cent. or more, owing to the formation of hydrogen on the negative plate. Grove's and Daniell's do not fall off, because the hydrogen is reduced by the nitric acid in the one case, and by the oxygen in the other. The internal resistance of Grove's cells is very small, usually below 1 ohm for a pint cell; Daniell's, from 5 to 15 ohms; Smee's, below 1 ohm, varying rapidly with the greater or less disposition of hydrogen.

The electro-motive force of batteries is, within certain limits, very variable, depending on a variety of undetermined causes. It is not much affected by temperature.

Law's Method.—The two elements or batteries to be compared are used in succession to charge a given condenser. Their electro-motive forces are in direct proportion to the charges communicated by them to the condenser. When batteries of very different values are to be compared, a shunt must be used in reading the throw due to the charge current of the larger one. The maximum current of a battery of given surface of plates is obtained when the resistance of the battery is equal to that of the circuit exterior to it.

If we have N elements, the resistance of each being r ohms, and the external resistance of the circuit R ohms, we must arrange the battery in n rows of each $\frac{N}{n}$ elements in series, and these rows we must then connect up parallel with each other. The number of rows will be

$$n = \sqrt{\frac{N n}{R}}$$

The resistance of each row being

$$\frac{N}{n} r = n R \text{ .... ohms.}$$

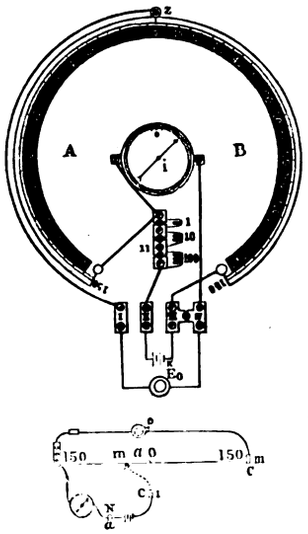


Figure 3.

For measuring electro-motive forces with Siemen's Universal Galvanometer, Professor E. du Bois-Reymond's modification of Poggendorff's compensation method is employed.

The upper diagram of figure 3 shows the connections to be made with the instrument. The needle i is to be brought to the zero point of the small scale by turning the galvanometer G round its vertical axis. The pointer, or vernier, Z, is to be brought by means of the handle g to the zero point of the large scale on the slate disc. The hole between II. and IV. to be left unplugged. Plugs to be inserted in 10, 100, and 1000. The two poles of the battery E_0 (which must be greater than E_1 and E_2) are to be connected with the terminals II. and III. The poles of the battery which is to be compared to E_0 are to be connected to terminals I. and IV. in such a manner that the similar poles of the two batteries are joined to terminals I. and III. and to II. and IV. respectively.

The galvanometer needle will now be deflected, and can be brought back to zero by turning the pointer Z either to the right or the left. Should, for instance, the pointer have to be brought to 30° on the A side, we have the following equation;

$$E_1 = E_0 \frac{150 - 30}{300 + u} \text{ .....(1).}$$

where u is the resistance of the battery E_0.

The battery E_2 is now to be inserted in the place of E_1, and the galvanometer needle, when it deflects again, brought back to zero by moving the pointer Z. If for instance the pointer has to be pushed to 40° on the B side to obtain an equilibrium, we have;

$$E_2 = E_0 \frac{150 + 40}{300 + u} \text{ .....(2).}$$

By eliminating u from equations 1 and 2 we have:

$$E_1 : E_2 = (150 - 30) : (150 + 40) = 12 : 19 \text{ .....(3).}$$

The two electro-motive forces are in the same proportion as the two observed distances of the pointer Z from 150° on the A side of the instrument.

The lower diagram of figure 3 shows the arrangements of the circuits for comparing the electro-motive forces by this method. The more powerful battery E_0 is connected at II. with one end of the resistance coils n, and at III. with the other end of the resistance coil, through the bridge wire. The battery E is connected at IV. with one of the termini of the galvanometer coil, whose other end is connected with one end of the bridge wire, and at I. with the movable pointer, or vernier, Z. The current from E_0 enters the resistance coils at II. and passes through them to the bridge wire, where two paths are open for its return—one *via* the bridge wire direct and the other through the galvanometer, the battery E and the vernier Z to the bridge wire. The current from E enters the bridge wire near the resistance coils n and traverses the former until it reaches the pointer Z, whence it returns. By moving the pointer until the tension is the same at IV. as it is at the junction of the bridge wire and the resistance coils n, no current will flow through the galvanometer.

ELECTRICITY FROM CAOUTCHOUC.—*By M. Demoget.* On one of the most humid days that have recently occurred, I chanced to notice that one of the little air-balloons, so common a source of amusement with children, produced, with the least friction, even under the most unfavorable circumstances, an enormous amount of electricity. It occurred to me to utilize this remarkable property in the construction of an electrophorus, by replacing the plate of resin with a membrane of caoutchouc strained on a metallic circle of 0.8 c.m. diameter. The result surpasses my experience. For it is sufficient to rub circularly with the back of the hand upon the lower surface of the membrane, to place it upon a good conductor, and to rub in the same manner the superior surface, in order to obtain, with an insulated metallic disc of 25 c.m. diameter, brilliant sparks of 3 to 5 c.m. length. In the most humid weather the same effect may be produced by previously slightly heating the caoutchouc membrane. It is well known that if two superposed sheets of paper be rubbed by the hand, after being slightly heated, and then separated in the dark, numerous sparks appear. Sheets of paper may, it has been found, replace the cake of resin in an electrophorus, with, of course, less brilliant results.

MATHEMATICS FOR NON-MATHEMATICIANS.

By William Paget Higgs, LL.D.

Division I.—The Algebra of Constant Quantities.

Tables of Logarithms continued.

TABLES of logarithms are usually arranged to give the mantissæ of the natural numbers, consisting of one to five digits,—that is, from 1 to 10,000; and when the given number, or *argument* as it is termed, has no more than five digits, its logarithm is found in the tables on inspection. But it will often occur that the argument has more than five digits, and the logarithm is found by following this reasoning:—Let us take* the log of 6276153. Now it can be shown that when any two large numbers differ by unity, the increase of the logarithm is sufficiently nearly proportional for all practical purposes to the increase of the number. We look then in the table for the logarithm of 62761 and for that of 62762, and find the mantissæ 0·7976899 and 0·7976988 respectively. The logarithm of 6276200 is then = 6·7976988, and that of 6276100 = 6·7976899. Their difference is 0·0000089. Thus for a difference of 100 in the numbers the difference of the logarithms is 0·0000089. We have then the common rule-of-three sum:—If 0·0000089 added to the logarithm of 6276100 gives the logarithm of 6276200, what must be added to the log. of 6276100 to give the log. of 6276153?

100 : 53 :: 0·0000089 : the number to be added; or—

$$\frac{53 \times 0{\cdot}0000089}{100} = 0{\cdot}000004717.$$

Disregarding the last two figures, we have—

log. 6276153 = 6·7976899 + 0·0000047 = 6·7976946.

Should the first of the figures omitted, however, be higher than 5, or 5 itself, 1 should be added to the number preceding it.

Had the log. of 627·6153 been required, or that of 0·0006276153, we have seen in the foregoing that they would be respectively 2·7976946 and 4·7976946.

Now that we have seen the reason, the rule to find the log. of a given number whose digits are in excess of those given in the table may be stated thus:—Find and write down from the table the mantissa for as many digits as are given. Take the difference between that mantissa and the next greater. Consider the remaining figures of the given number as a decimal fraction, and multiply the difference by this fraction, rejecting as many figures from the right of the product as the multiplier contains. The result added to the lesser mantissa is the mantissa of the logarithm of the given number. Study of the example given above will explain this apparently difficult rule.

The number to be added to a lesser log. to give the log. required is termed the *proportional part*, and is given in the best tables. But as these are variously arranged, we leave the student to consult the instructions accompanying the tables he may

* This and the next example are from p. 125 of Prof. J. H. Smith's "Treatise on Elementary Trigonometry," a work we advise the student to procure.

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select, content ourselves with imparting to him the *reason* for what he there will be directed to do.

How to find the number to which a log. corresponds we have next to consider. The number may be found exactly in the table, but it may also occur that the exact number is not given exactly. We then state proportionally the difference between the log. next less and that next greater, and the difference between their corresponding numbers :— Thus, suppose we wish to find the number corresponding to the logarithm 3·9212074, the tables give—

log. 8340·8=3·9212077
log. 8340·7=3·9212025

That is,—if a difference of 0·1 in the numbers gives a difference of 0·0000052 in the logarithms, what difference in the numbers will a difference of—

(3·9212074—3·9212025) or 0·0000049

in the logarithms give ?

0·0000052 : 0·0000049 : : 0·1 : 0·094,

which added to 8340·7 gives 8340·794

Rule.—Subtract from the given log. the next less tabular log., and this tabular log. from the next greater tabular log. Divide the first difference by the second or tabular difference, and the first two or three figures of the quotient annexed to the figures of the lesser tabular number will be the number required.

Example—

3·9212074	3·9212077
3·9212025	3·9212025
0·0000049	0·00000·52
	52)49
	·94

and this annexed to 8340·7 gives 8340·749, as before.

The Arithmetical Complement.—This device, discovered by Gunter about 1614, although of very constant use with logarithms, is not by any means an invariable accompaniment of logarithmic tables. Indeed, the addition of the arithmetical complement to every logarithm would render the tables exceedingly unwieldy, and is the more unnecessary since the complement may be very easily calculated. The rule is—*begin at the left hand, and subtract every figure from* 9 *until the last; subtract that from* 10. The reason for the rule is too obvious to need explanation, but an example may aid the student. Thus to find the arithmetical complement to the log. 2=0·30103,

9 9 9 9 10
3 0 1 0 3
6 9 8 9 7

and to log. 7=0·84510,

9 9 9 10
8 4 5 1 0
1 5 4 9 0

Results which the student can verify by reference to the table.

Transformation of Systems of Logarithms.

Hitherto we have considered only the common system of logarithms, or those calculated to the base 10. It is, however, evident that there may be other bases, and consequently other systems of logarithms. The celebrated Baron Napier, the discoverer of logarithms, employed as a base the sum of the following series,* denoting the sum by e.

$$2 + \frac{1}{2} + \frac{1}{2.3} + \frac{1}{2.3.4} + \text{to infinity.}$$

* For an explanation of this term the student is referred to subsequent pages.

The first eight digits of this sum are 2·7182818, and this is the base of what is known as the Napierian or hyperbolic system of logarithms. This system is used in present scientific investigation, and the general principles of the conversion of this system into the common, or of the common into this, will be of service to the student.

Suppose there are any two systems of logarithms whose bases are b and B, and that there is a number n which has x for its log. in the first system and y for its log. in the other system. Then n will be equal to either b^x or B^y, and as we have the first of mathematical authorities—old Euclid—for the assertion that "things equal to the same thing are equal to one another," we may say that b^x is equal to B^y. And if we refer to the principle of the equation given in an earlier page we shall see that (which is or should be self-evident) if we divide the x on one side by the y on the other we still maintain an equation, and that $B=b^{\frac{x}{y}}$ (or dividing by y on both sides we have $B^{\frac{y}{y}} = b^{\frac{x}{y}}$, the same thing). Therefore $\frac{x}{y}$ is the log. of B to the base b; and writing this—

$$\frac{x}{y} = \log._b B,$$

we shall at once see the inverse or reciprocal to be—

$$\frac{y}{x} = \frac{1}{\log._b B.}$$

The reciprocal is taken to allow of readily multiplying both sides of the question by x, whence we obtain the value of y, which is—

$$y = \frac{1}{\log._b B.}\,x$$

And this teaches us that if the log. of any number in the system of which the base is b be multiplied by—

$$\frac{1}{\log._b B.}$$

we shall arrive at the log. of that number to the base B. The multiplier or constant—

$$\frac{1}{\log._b B}$$

is termed the *modulus* of the base B with regard to the base b.

The modulus of the common system of logarithms with relation to the Napierian system is, it follows,

$$\frac{1}{\log._e 10.};$$

and as the numerical value of log. e10 is by calculation 2·30258509, this number divided into unity gives 0·43429448, the modulus of the common system, or the number by which the Napierian logarithm must be multiplied to give the corresponding logarithm of the common system. Similarly 2·3, &c., is the modulus by which a common logarithm is to be multiplied to obtain the corresponding Napierian logarithm.

In practice the reduction of common to hyperbolic logarithms may be effected, but only approximately, by multiplying the common logarithm by 2·3.

When presently more advanced, the student may with advantage return to this chapter, and trace the reasoning embodied in the following formulæ :—

It may be shown that—

$$\log._b B \times \log._B b = 1.$$

For if $b^x = B^y$, then $b = B^{\frac{y}{x}}$

$B = b^{\frac{y}{x}}$; and

$\frac{y}{x} = \log._B b$,

$\frac{x}{y} = \log._b B$. Therefore

$$\log. \; B \times \log._B b = \frac{y}{x} \times \frac{x}{y} = 1.$$

Another exercise, and one by which speed and accuracy in calculation may be gained, is the finding of certain logarithms from other given logarithms.

Given the log. of 2 = 0·3010300 to find the logs. of 64 and 128.

Now 64 is the sixth power of 2; hence by Rule III. the log. of 64 will be six times the log. of 2 The log. of 64 is 1·8061800.

The log. of 128 will be the log. of 64 plus the log. of 2, or seven times the log. of 2.

The following example, adapted from one given by Prof. Smith, affords very useful illustration :—

Given log. 5 = 0·6989700, find the log. of $\sqrt[7]{(6·25)}$.

By Rule IV. the log. of the seventh root of 6·25 is equal to the seventh part of the log. of 6·25. Now we may write 6·25 in the form of a mixed vulgar fraction, as $\frac{625}{100}$, and the resolution of this fraction by logs., according to Rule II., is log. 625 — log. 100, because the form of the fraction indicates that 625 is to be divided by 100; 625, again, is the fourth power of 5, and 2 is the log. of 100. Then—

(log. 625 — log. 100) = 5^4 — 2).

And as the log. of the fourth power of 5 is equal to four times the log. of 5, the expression—

$$\frac{(4 \log. 5 - 2),}{7}$$

which may be read four times the log. of 5 less 2 divided by 7, will give the answer.

Log. 5 = 0·6989700	
multiplied by 4	4
	2·7958800
less 2	2·2000000
divided by 7	0·7958800
	0·1136114

And by similar applications of the four primary rules many examples may be put and solved by the student himself.

MAXIMUM RESISTANCE OF MAGNETIC COILS—*Fourth note by M. du Moncel.*—The author has shown in these notes—(1) That a given helix produces its maximum effect when its proper resistance is greater than that of the exterior circuit in the proportion of 1 to $1 + \frac{c}{a}$; (2) that with the same diameter of coil the helix giving the best results is that in which the wire has such thickness and length that its resistance represents that of the exterior circuit; (3) that the thickness of magnetic helices should be equal to the diameter of the magnetic cores they surround; (4) that their length should be equal to this diameter multiplied by 11, or practically, by 12.

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CORRESPONDENCE.

MANAGEMENT OF BATTERIES.

To the Editor of the Journal of the Telegraph:

Agreeably to your request, I note the results of my experience in the management of gravity batteries, and in this I include both forms known in this country; the Hill and Callaud, but not the Lockwood, or any form having a reservoir or magazine, of sulphate of copper crystals.

The Hill battery, an American invention, has been in use for several years, with varying success. Since the introduction of the Callaud, the same variety of opinion prevails, with regard to its utility. While one manager is delighted with the action of either of the forms, another will tell you that he has tried one or both, and they are "humbugs, sir!" and that he has "gone back to Grove—the only reliable battery." Why this diversity of opinion?

Simply, because the philosophy of action of the battery is not understood. A thorough knowledge of its peculiarities will enable any one to work and manage a gravity battery with entire success, and at one-third the cost and trouble that is required in the use of a "Grove."

And the foundation of it all, is this law: *The amount of current flowing to line is in inverse proportion to the resistance in the circuit.* And:

The consumption of material is determined by the amount of current furnished to the line. Or, in other words, the chemical action of the battery is in direct proportion to the work performed.

Hence it follows, that the amount of sulphate of copper converted or consumed in one battery, gives you no result from which to calculate the consumption in a battery on a line of different resistance.

And this brings us to the foundation of all the trouble experienced. The jars have been charged with an arbitrary amount of sulphate of copper, regardless of the resistance of the circuit. The blue vitriol is dissolved by the water, and unless the action of the battery is sufficient to convert the vitriol as rapidly as it dissolved, the blue solution will rise until it comes in contact with the zinc.

In local batteries this is seldom the case; for the total resistance in circuit is but a few units, and the blue vitriol is converted as rapidly as it is dissolved. But batteries on main circuits are so choked back by the line resistance—unless the line is very short—that the vitriol is dissolved with greater rapidity than it is used. Consequently, the copper soon deposits upon the zinc discs, and the battery is ruined.

My rules are: to drop a piece of vitriol of the size of a walnut, into each jar, when it is set up. Let this dissolve, then add small crystals, until the blue solution is, say two inches high, from the bottom of the jar. Instruct your battery man to add the crystals daily, keeping the solution as near as possible at the above height. Wipe off the outside of of the jar, and the inside, above the fluid, daily, to remove the salt of zinc that may be deposited there by evaporation. When the sulphate of zinc solution becomes syrupy, like strained honey, or begins to deposit crystals on the zinc disc, draw off half of it with a syphon, made of twelve to eighteen inches of soft rubber tubing, and fill with fresh water. See that fresh water is added, to replace that lost by evaporation. Keep the battery room warm and dry.

The above rules do not require severe study, or a knowledge of chemistry. They are easily understood, and efficacious. I have yet to find any one so ignorant or stupid as to fail in applying them successfully. And if batteries are managed in this way, they do not need cleaning or taking down. On this company's lines, one battery, working two wires, was set up March seventeenth, 1872; another with four lines, July first, same year. These are both Callaud. A Hill, put up in July last year, is still working beautifully. Several others have been working from six months to one year each. None of them have been taken down, and all are clean, and working well.

It is a mistake, to suppose that the action of a sulphate of copper battery is increased by "crowding it," with an excess of sulphate of copper. So long as there is even a small portion of blue vitriol solution in the jar, its action is as vigorous as if there was a gallon. And I repeat, whenever there is an excess, and the consumption per minute is less rapid than the solution of the crystals by the water, this solution must rise until it reaches the zinc.

The electro-motive force of the sulphate copper battery, being about one-half that of the Grove, double the number of jars is necessary. But the chemical action of the Grove is so much more rapid than that of the sulphate copper, that many more lines can be worked from the former than the latter. The sulphate of copper is sparingly soluble in water, and when you lessen the external resistance, by adding lines, you soon reach the limit of its capacity to supply the blue solution as rapidly as it is needed. The average of lines to be worked economically from the sulphate copper battery is four or five. I prefer the lesser number.

As the internal resistance of a main battery is exceedingly small, compared with that of the line, it may be practically disregarded. I therefore use but one-fourth of a pound of sulphate of zinc to each jar, when setting up a new battery. Callaud's plan of lowering the zinc, to decrease the internal resistance in a main battery, is entirely useless, and from the loosening of the binding screws and consequent dropping of the zincs, this arrangement of hanging the discs is actually a detriment to the battery, instead of an advantage. The only safe way is to hang the zinc the proper height, and then bend over the top of the suspending wire and cut it off; leaving it in the form of a hook on top of the binding screw. I have remedied this trouble, in the zincs used by this company, by casting a copper wire loop in the top of the stem, through which passes a round wooden rod, across the top of the jar. Thus the zincs are all at an equal distance from the bottom of the jar, and the internal resistance of all the jars must be alike. I use the same style and size of zincs, coppers and jars, for main and local batteries.

I am pleased to see that the day is at last dawning when the wasteful and offensive Grove battery will be numbered with many other obsolete things of our early telegraphing.

C. H. Haskins.

Milwaukee, Sept. 16, 1873.

Montgomery, Ala., Sept. 16, 1873.

To the Editor of the Journal of the Telegraph:

Saturday night New Orleans sent us a red message to conductor sleeping car, which would arrive here Sunday morning. In the morning the boy took the message to the depot, three-quarters of a mile from the office, but no "sleeper" had arrived. During the day, New Orleans asked, "Was our red 13th to Conductor Pullman car delivered? Answer quick;" and was answered "No sleeping car from Lynchburg to-day; message not delivered yet." Monday morning the boy again took the message to the depot, and this time was successful in delivering it. About 10 o'clock New Orleans enquired "Was red 13th sleeping car conductor delivered this A. M.," and the reply in the affirmative sent. Here were five messages transmitted, and the messenger compelled to walk three-quarters of a mile twice, causing delay in the delivery of other messages, and the Company receives for all of this service the pitiable sum of fifty cents.

Now don't you think compensation a little more adequate to the service performed would have been more in accordance with the "fitness of things," and that Rule 13 might have been applied in this instance with considerable fitness?

Montgomery.

Hansells, Ind., September 4, 1873.

To the Editor of the Journal of the Telegraph:

A communication signed H, in the Journal of March 1st, claims that three-fourths of the telegraphic bulls arise from spaced letters. Let us examine this assertion, and see if it has any foundation in fact.

If the abstract principle of space, as applied to telegraphic characters, is a cause of error, then it must apply to the whole alphabet; for no letters formed by the combination of two or more dots or dashes, can be written without spacing.

To assert that this principle of *space* is more defective when used in a clear and defined form, as it is used in forming what are called *spaced* letters, than it is when used in a reduced form, as it has to be used, in the formation of nearly all alphabetical characters, is simply absurd.

Again: There is very little, if any, difference in the sound of the instrument in spaces and dashes; the only means of divining whether it is a space or a dash, when made on the instrument, is the back stroke.

The principle of space in sound is inherent in all combinations, and on telegraphic alphabet can be written without it. Space in sound occurs in dashes, the same as in spaced letters. In the former case, the armature is inclined toward the magnet, in the latter it is reversed; but the interval of silence is the same in both.

Every operator knows that spaced letters are the easiest to write, and that beginners learn them more rapidly than any others. They are the musical letters of the alphabet.

But is it a fact, that a large majority of telegraphic errors arise from spaced letters? My experience has been exactly the reverse. Let me give a sample or two. A message was written "Send two bull wheels." The receiving operator got it, "Send two butt wheels." Another message was written "Mary and little one are doing well." The receiving operator presented the expectant father with the following: "Mary and litter are doing well." I think every experienced operator will bear testimony to the fact, that the letters T, and L, and the cypher are more frequently the cause of errors than any others. They are continually being mistaken, the one for the other.

An experience of ten years constant practice at the telegraphic key convinces me that errors do not arise from defects in the alphabet, but from entirely different and extraneous causes. Among them are —poor operators, who, from the very nature of things must do blundering work. Every operator knows that bulls are very seldom perpetrated by first-class operators, and when, in isolated cases, such do occur, they are chargeable, not to inherent defects in the alphabet, but to atmospheric or other disturbance of the circuit. It is human to err, but to charge telegraphic errors to defects in the alphabet, is not warranted by the facts. H. says further,

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that the European alphabet may be written as rapidly as ours, and can be read much faster. Let us see what ground there is for this assertion.

In the Morse alphabet I find, including spaces, only 143 characters, while in the European there are 182, an excess of 39 over the Morse. In this estimate I have counted only the 26 letters, 10 figures, and the period, comma, interrogation, and exclamation points, as they are all that are in common use. In the above 182 characters of the European alphabet, there are 88 dashes, while in the Morse there are but 49 dashes and spaces together; making an excess of 39 dashes in the European alphabet. Thus it will be seen that the 39 extra characters, which we would be compelled to use, were the proposed change of alphabet made, are all dashes, which are the slowest characters to form with the telegraphic key. H. will have much difficulty in convincing intelligent operators that they can write an alphabet of 182 characters as rapidly as one of only 143, and these 143 the same as the 143 shortest characters in the other aggregate of 182.

But what is to be gained by the proposed change? Has it been shown that telegraphic errors are less frequent in Europe than in America? Can it be demonstrated that inexperienced operators will make less errors with the European than with the Morse alphabet? Certainly not. I have already shown what causes most of the errors in telegraphing. These same causes would bring about the same, or worse results, were we to adopt the European alphabet. The remedy for these difficulties is not in a change of alphabet, but in setting up a higher standard of operative skill and care; and requiring all, who are to be trusted with this important business, to become more proficient.

M. E. W.

To the Editor of the Journal of the Telegraph:

Rule 58 requires free delivery within half a mile of all offices. What course should managers pursue in regard to delivering messages beyond this limit, to parties who *persistently* refuse to pay a reasonably small sum for such extra service—how dispose of their messages? Please reply in next JOURNAL.

C. A. RUNYAN, Manager.

Answer.—Notify such parties, through the post-office, that a message to their address is lying in your office, requesting them to call for it.

ST. LOUIS, Sept. 17th, 1873.

To the Editor of the Journal of the Telegraph:

Party sends message to certain address. Receiving office notifies, "Party moved—not there, &c." If sender wishes to send another or a corrected address, should it not be sent at sender's expense?

E. H. BROWN, Manager.

Answer.—Yes. Instructions of this character should be embodied in a message to the manager of the office receiving, and charged for.

To the Editor of the Journal of the Telegraph:

Please say how many words in following message:—"Smith, New York. Meet me at ferry to-night. (Signed) Jas. Brown, of Wm."

CLERICUS.

Answer.—Such suffixes to a signature as given above should be charged for. They do not come within the scope of the generally understood and necessary appellations of Junior, Senior, First, Second, or Third. The suffix "of William," or any other place, is entirely local in its application, and in use only to a limited extent in a few sections of the country.

To the Editor of the Journal of the Telegraph:

I would like to ask of you a little information about checking San Francisco, Cal., and other lines, you say:

*Boggs, Cal., 30 10 Colusa, Cal., ck. San Francisco.

Why do I check San Francisco—why not Colusa? I checked San Francisco once, on message similar to this. He (San Francisco) said I over-checked him. Please answer how it is and oblige,

E. LEGETT.

Answer.—San Francisco is checked simply as a matter of convenience. Communication by mail with points in the Pacific Division is extremely slow and difficult. It was therefore decided to check all Pacific Division business to San Francisco.

DR. J. H. NELSON.—An invention telling when the line is working, even though the instrument is out of adjustment, is hardly of value at this day. Insulation has become so perfect, and batteries so well regulated to the resistances of the lines, that there can be no excuse for an operator whose instrument is not adjusted. Such an invention, it seems to us, would prove only a premium for carelessness and inattention. Send us a description as you suggest.

C. H. H.—Rule 9 contains the following clause: "Words connected by a hyphen, as found in Webster's Dictionary, to be counted as one word." The word "Lookout," is covered by this rule.

J. W. F.—No part of an address should be charged for. On the contrary, full directions are invited and desired. We have answered substantially the same question many times, of late.

GEO. COLE.—Let us know what numbers of the JOURNAL are necessary to complete your office files, and we will endeavor to supply them. The Company will not pay for binding the volumes of the paper for the use of offices.

SHERMAN, TEX.—An office receiving a transfer, for say, John Smith, care Brown, should deliver it to Smith only. If Smith is absent, the money should be held until his return, unless proper authority is presented for its delivery to Brown.

B.—No notice taken of anonymous communications.

AMERICAN INVENTIONS.

THE cotton gin, without which the machine spinner and the power loom would be helpless, is American. The power shuttle, which permits an unlimited enlargement of the breadth of the web, is American. The planing machine is American. Navigation by steam is American. The mower and reaper are American. The rotary printing presses are American. The hot-air engine is American. The sewing-machine is American. The machine manufacture of wool cards is American. The whole India-rubber industry is American. The band-saw originated, we believe, in America. The machine manufacture of horse-shoes is American. The sand-blast, of which the large capabilities are yet to be developed, is American. The guage-lathe is American. The only successful composing machine for printers is American. The grain elevator is American. The artificial manufacture of ice was originally invented by Professor A. S. Twining, an American. The electro-magnet was invented, and immediately after its invention was first practically applied in transmitting telegraphic signals, by Professor Joseph Henry, an American. The telegraphic instrument introduced a few years later into public use, which has since obtained universal acceptance, was invented by Samuel F. B. Morse, an American.—*Boston Journal of Chemistry.*

FOREIGN TELEGRAPHIC ITEMS

TELEGRAPH EXTENSION IN BRAZIL.

THE Rio Janeiro correspondent of the New York *Herald*, under date of August 25th, writes:

"Our telegraphs are now in progress, the laying of the section of coast cable from Pernambuco to Pará having been commenced at Pernambuco on the 8th of August, and by last accounts was proceeding successfully at the rate of one hundred miles a day, so that by the 30th it should be completed to Pará, after which the section from Pernambuco to Rio will be submerged. Soundings for the latter are being conducted by the Brazilian steam corvette, Vital de Oliveira, and will be finished within a few days.

"The three hundred and eighty miles of telegraph cable for the stretch between Montevideo and the Brazilian frontier arrived on the 9th at Montevideo, and will be laid forthwith. As regards the section between the southern frontier and Rio, all but the shore ends for Santos, Paranaguá, Santa Catharina and Rio Grande are ready in London, and by a recent meeting in Rio of the stockholders of the Platino-Brazilian Telegraph Company the contracts for the remaining parts have been authorized. At the same meeting the working agreements between the Company and the Western and Brazilian and the Montevidean and Brazilian Companies were definitely ratified. By these agreements the Western and Brazilian Telegraph Company takes complete charge of the cables from Pará to Montevideo, and it purposes laying this year a cable from Pará to St. Thomas, to join Brazil, on to the United States.

"The Brazilian Government has given great assistance to the cable companies, both directly and indirectly. Thus, the corvette Paraense was lent for the soundings from Pará to Pernambuco, and to escort the Hooper while laying the cable. The Vital de Oliveira is furnished for the soundings from Pernambuco to Rio, and the Madge is detailed for similar services in regard to the section from Rio to the southern frontier. The telegraphists in the Hoopér are also loud in praise of the assistance received at Pernambuco from the authorities."

AT a meeting of the Board of Directors of the Anglo-American Telegraph Co., held on the 22d August, it was resolved to pay an interim dividend of £2 per cent. free of income tax on the capital of the company, viz., £7,000,000, for the four months ending the 31st July. The register of transfers will be closed from the 10th to the 14th of September, both inclusive, and the warrants for the dividend will be payable on and after the 1st of October next.

The first or statutory meeting of the Globe Telegraph and Trust Company was held on the 27th August. From the report presented it appears that, of the 300,000 shares of £10 each offered to the public, the directors have alloted 224,532 shares, of which 112,266 were for preference shares, and the remainder —112,266—for ordinary shares. Of this number 216,652 were issued in exchange for stock or shares of other companies. The report was unanimously adopted.

The laying of a second cable from England to Denmark for the Great Northern Telegraph Company was completed on Sept. 2, 1873, by Mr. W. T. Henley, of North Woolwich. A cable also from France to Denmark, and one from Denmark to Sweden, have been laid by the same firm during the last few weeks, making an addition of nearly 1,000 miles to the Great Northern Company's system.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 BROADWAY, NEW YORK,
October 1, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last Circular:

GENERAL INFORMATION.

Auburn, Ala., re-opened; square 267.
Loachapoka, Ala., re-opened.
Shelby Springs, Ala., closed.
Seaview House, West Haven, Conn., closed.
Laurel, Del., closed.
St. Marks, Fla., closed.
Hereafter the "tariff for Other Lines" to Cedar Keys, Fla., will be 150 and 14 from Lake City, Fla.

Until further notice offices will refuse Half-rate business for Pensacola, Fla.

French Village, Ill., closed.
Opdyke, Ill., closed.
Dahlgren, Ill., closed.
Business for Rutland, Ill., will hereafter be checked direct.
Messages may be taken for Rensselaer, Ind., and delivered by stage from Remington, Ind. Charges for delivery, 25 cents.
Fort Harker, Ks., closed.
Carlisle, Ky., closed.
Philadelphia Furnace, Ky., changed to Pennsylvania Furnace.

Half-rate business can now be taken for Shreveport, La.

Business for Hampden, Me. (Upper Corner), can be delivered from Hampden Corner, Me. Charges for delivery, 25 cents.
Deer Park, Md., closed.
Elba, Mich., re-opened.
Blissfield Junc., Mich., closed.
Fayette, Hillsdale Co., Mich., closed.
Hereafter the "tariff for Other Lines" to Morenci, Mich., will be 25 and 2 from Toledo, O.
The office at Fayette, Mo., will hereafter be in square 409.
Bethlehem, N. H., closed.
Crawford House, N. H., closed.
Fabyan House, N. H., closed.
Glen House, N. H., closed.
Twin Mountain House, N. H., closed.
Mt. Washington, N. H., closed.
Mt. Washington Depot, N. H., closed.
Profile House, N. H., closed.
Waumbeck House, Jefferson, N. H., closed.
Deal, N. J., closed.
Chittenango Springs, N. Y., closed.
Catskill Mountain House, N. Y., closed.
Little Mountain, O., closed.
The P. O. A. of Glenwood, O., is Ava, Noble Co.
Cresson Springs, Pa., closed.
Lincolnville, Pa., closed.
Milford, Pa., re-opened as an Other Line office; tariff 20 and 2 from Port Jervis, N. Y.
Business for Wiconisco, Pa., will hereafter be delivered from Lykens, Pa.; charges for delivery, ten cents.
The P. O. A. of Buena Vista, Butler Co., Pa., is Peachville, Pa.
Watch Hill, R. I., closed.
Mossy Creek, Tenn., closed.
Mineola, Texas, is now a W. U. office, square 470; check direct.
Jordon's White Sulphur Springs, Va., closed.
Livingston, Va., closed.
Rockbridge Baths, Va., closed.
Berkeley Springs, W. Va., closed.
Elizabeth, W. Va., closed.
Stillwater Junc., Wis., closed.
Highgate Springs, Vt., closed.
Yellow Sulphur Springs, Va., closed.

NEW OFFICES.

276	Childersburg, Ala.				
	San Bernardino, Cal.				
*	Archer, Fla.,	125	9	198	Lake City, Fla.
*	Callahan, "	75	9	198	"
*	Waldo, "	100	9	198	"
256	Sugar Valley, Ga.				
175	Waynesboro', "				
307	Canfield, Ill.				
299	Redmon, Ill.				
417	Cincinnati, Iowa.				
444	Aurelia, "				
376	Olewein, "				
*	Pennsylvania Furnace, Ky.,	25	2		Riverton, Ky.
*	Fyfe Lake, Mich.,	80	6		Grand Rapids, Mich.
360	Poplar Bluff, Mo.				
*	Chestertown, N. Y.,	40	3	45	Saratoga, N. Y.
*	Hadley, "	25	2	45	"
*	Jessup's Landing, N. Y.,	25	2	45	"
111	Limestone, "				
*	Luzerne, "	25	2	45	Saratoga, N. Y.
*	North Creek, "	45	3	45	"
*	Ontario, "	25	2	74	Oswego, N. Y.
*	Palmer's Falls, "	25	2	45	Saratoga, N. Y.
*	Pottersville, "	50	3	45	"
*	Riverside, "	45	3	45	"
*	South Corinth, "	25	2	45	"
*	Schroon Lake, "	50	3	45	"
*	Stony Creek, "	30	2	45	"
*	Thurman, "	30	2	45	"
*	The Glen, "	40	3	45	"
*	Weavertown, "	40	3	45	"
*	Williamson, "	25	2	74	Oswego, N. Y.
*	Fayette, Fulton Co., O.,	25	2	211	Toledo, O.
180	Seville, O.				
84	Newberry, Lycoming Co., Pa.				
59	Royers Ford, Pa.				
155	Fort Mills, S. C.				
36	Pownal, Vt.				
*	Atleys, Va.,	25	2	96	Richmond, Va.
*	Craigsville, Va.,	40	3	96	"
*	Callaghans, Va.,	40	3	96	"

OFFICES HAVING SPECIAL SHEET A,
Will check Royer's Ford, Pa., 25 cents more than "special rate" to Philadelphia, Pa.—square rate not to be increased.

On and after October 13th, 1873, unless authorized by special notice before that date, the use of all *exceptional* or *special* rates, TO or FROM any of the offices named in the following list, will be discontinued, and the Local, Square, or State rates (whether an advance or reduction in rates is made by the change) will be adopted.

The offices named in this list will disregard all notices to "Offices having Special Sheet A" in this and succeeding numbers of the JOURNAL.

Altoona, Pa.	Logansport, Ind.
Ashtabula, O.	Lewistown, Pa.
Anderson, Ind.	Miller Farm, Pa.
Bellefontaine, O.	Middletown, O.
Bridgeport, Belmont Co., O.	Miamisburg, O.
Bowling Green, Ky.	Madison O.
Brownsville, Tenn.	Monroe, Mich.
Brady's Bend, Pa.	Mohawk, N. Y.
Burlington, Iowa.	McGregor, Iowa.
Cresson, Pa.	McKeesport, Pa.
Clyde, O.	New Albany, Ind.
Cumberland, Md.	North East, Pa.
Crown Point, Ind.	North Judson, Ind.
Chambersburg, Pa.	Oil City, Pa.
Clarksville, Tenn.	Pioneer, Pa.
Conneaut, O.	Parkers Landing, Pa.
Cambridge, O.	Port Perry, Pa.
Dunkirk, N. Y.	Paris, Tenn.
Dubuque, Iowa.	Painesville, O.
Davenport, Iowa.	Perrysburg, O.
Elgin, Ill.	Petroleum Centre, Pa.
Elyria, O.	Pit Hole, Pa.
Enterprise, Pa.	Pleasantville, Pa.
Eaton, O.	Piqua, O.
Forest, O.	Quincy, Ill.
Frankfort, Ky.	Richmond, Ind.
Fairmount, W. Va.	Royal Centre, Ind.
Foxburgh, Pa.	Racine, Wis.
Fort Madison, Iowa.	Rockford, Ill.
Franklin, Pa.	Rock Island, Ill.
Fremont, O.	Rouseville, Pa.
Fagundas, Pa.	Scrubgrass, Pa.
Geneva, O.	Sandusky, O.
Galva, Ill.	Shamburg, Pa.
Galesburg, Ill.	Springfield, O.
Galena, Ill.	Tiffin, O.
Gettysburg, Pa.	Titusville, Pa.
Greensburg, Pa.	Triumph, Pa.
Hagerstown, Md.	Tarr Farm, Pa.
Hancock, Md.	Terre Haute, Ind.
Huntington, Pa.	Trunkeyville, Pa.
Hannibal, Mo.	Union City, Ind.
Hebron, Ind.	Urbana, O.
Hamilton, O.	Waukegan, Ill.
Johnstown, Pa.	Wyanet, Ill.
Jeffersonville, Ind.	Warren, Ill.
Kokomo, Ind.	Warsaw, Ill.
Kenosha, Wis.	Washington, Pa.
Keokuk, Iowa.	Washington, G. Co. O.
Kittanning, Pa.	Xenia, O.
Lexington, Ky.	Zanesville, O.
Lafayette, Ind.	

CUBA CABLE BUSINESS.

We are notified that communication by cable to Martinique, St. Lucia, St. Vincent, Grenada, Barbadoes, Trinidad, Demerara and Berbice is interrupted. The cable between Dominica and Martinique is broken.

WILLIAM ORTON,
President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Sept. 24th, 1873.

On and after October 1st, Columbia, Tenn., will be added to the list of money order offices in J. B. Tree's district.

MILLERSTOWN, reported in last issue of the Journal as having been added to the list of money order offices in C. O. Rowe's district, is in Butler Co., Pa.

G. H. MUMFORD,
Vice-President.

INFORMATION WANTED.

Mr. M. E. BOOTH, operator at Alliance, Ohio, desires the address of JAMES C. TOWNS. When last heard of, Mr. TOWNS was operating at Brookville, Kansas.

TELEGRAPH IMPROVEMENTS IN PENNSYLVANIA.

The *Reading (Pa.) Eagle* of September 23d, states that the Western Union Telegraph Company are making considerable improvements in that vicinity, by placing large, straight and nicely dressed poles along the line of their wires, in lieu of the crooked ones heretofore in use. The company are adding two new wires along the line from Philadelphia to Pottsville, and from Reading to Harrisburg, and replacing the two old wires with new ones. Instead of continuing down the turnpike as at present, the wires will be taken across Madison bridge, a short distance below that borough, and run down the Schuylkill road to Phœnixville, where they will recross to the turnpike again.

New offices will be opened at Phœnixville and Royer's Ford. The Pottstown office will be refitted and the new wires put in. The rapidly increasing business of the company along this route render these improvements and additional facilities necessary. Mrs. H. L. Brower, the polite and very obliging operator at Pottstown, deserves credit for the faithful and very accurate manner she attends to the duties of her position. During the many years she has been on duty there as operator, not a single word of complaint has ever been entered or fault found with her. The lady always appears pleasant, is very attentive, and gives universal satisfaction to all who have business with the office.

BORN.

ARTHUR.—At Hanover, O., Sept. 15, 1873, to J. G. Arthur, Manager W. U. Tel. Office, a daughter.

KELLY.—At Huntington, Pa., Sept. 21, 1873, to James Kelly, Manager W. U. Tel. Office, a son.

MARRIED.

GREENE—BURCH.—At White Pigeon, Mich., Sept. 12, 1873, by Rev. Byron Russell, A. A. Greene, Manager W. U. Tel. Office, Windsor, Mo., to Miss Frank Burch, of Carthage, Mo.

DIED.

PHILLIPS.—At Providence, R. I., Sept. 14, 1873, Irving Adderman, eldest son of Walter P., and Francena Adelaide Phillips, in the fifth year of his age. Also, in same place Sept. 16, 1873, Eugene Dunbar, infant son of Walter P. and Francena Adelaide Phillips, aged one month.

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TELEGRAPHIC INSTRUMENTS AND MACHINERY AT THE CINCINNATI EXPOSITION.

One of the most complete and perfect features of this year's Exposition is the collection of telegraphic instruments and their various adaptations. No finer display of the kind has ever been made in this country, and to any one interested in the progress made in electric science no more favorable opportunity for study could be desired. Important discoveries and improvements are shown, which are now in successful use, and of which the ordinary public has never even heard. In fact, the mysteries of telegraphy are something which very few people beyond operators know anything about. Yet the initiated few are not idle. Every year is prolific in improvements of permanent value, which serve to expand the telegraphic service of the country as its growing necessities require. A large number of these inventions may be seen in operation in the Main Hall, a full description of which would fill columns. It is only possible, in this short article, to refer briefly to the leading ones.

The American fire alarm telegraph is exhibited from New York. It is by the same inventors, and essentially the same system as that now in use in this city. There is difference, however. The alarm given by the automatic system strikes directly upon the bells; whereas by our present system it is turned into the central station, and there repeated by an operator, which consumes more or less time. The striking of the numbers is regulated by clock work in the alarm boxes. This mechanism is set in motion by the mere pulling down of a brass hook or knob, which is plainly visible on opening the outer door of the box—and this action is all that is necessary to create an alarm of fire. So perfect is this mechanism that it is utterly impossible for any other than the correct signals to be transmitted, and when once started, it can in no way be interfered with until it has performed its entire work. If by chance two alarms should be turned in simultaneously, one would wait until the other was finished before striking. The connection between the alarm boxes and the bells is made by a beautiful piece of electro-mechanical work called an automatic repeater. The display embraces a complete circuit, representing several alarm boxes, as well as the central and other fire stations. About four thousand dollars were expended in making and putting in place the machinery of this single exhibition.

Another display of novel and interesting instruments is made by an association of this city. "Semaphore" or repeating signal is an ingenious contrivance for dispatching trains, signaling at station yards, junctions, crossings, curves, &c. It is self-operating and instantaneous. By a mere touch of the instrument a white or red signal can be raised at a point a mile distant. Another signal improvement of this nature is an automatic clock signal, which uses the track itself as an electrical conductor for operating semaphoric signals. This system is designed more especially for double track roads, and absolutely prevents trains following each other on the same track—except within a stated distance. In case a train breaks in two, and a portion of it is left standing on the line, the signal will indicate the fact to the following train.

In this same collection is shown an instrument which looks like a combination of a melodeon and a sewing machine. Each key is lettered, and the operator, generating electricity by a pedal, fingers off a dispatch which is perfectly printed at the other end of the line. Other telegraphic printing instruments are shown, among which is the dial plan in present use by our police. The exhibitors of this collection have the contract for running the police telegraph of this city.

An interesting piece of mechanism is shown, which was made by Wheatstone, the celebrated English electrician, for testing the amount of resistance on telegraph lines. By some mysterous means a break in the line can be located from any distance to within a hundred feet. Should the Atlantic cable suddenly part, this little instrument could direct a ship to the very spot where the difficulty lay.

A regular set of telegraphic instruments, made of solid silver, and worth $2,000, attracts considerable notice. It is exhibited by a New York company, who also have in operation the wonderful little gold and stock telegraph printing instruments, by which quotations are printed simultaneously every day in our leading banking houses. A variety of specimens of submarine cables, and a large collection of telegraphic machinery of every description, make this a very full and interesting display.

Among the other inventions is what is called a "double Morse telegraphic alphabet," patented by Mr. Nicholson, of this county, which, it is claimed, insures greater speed and simplicity in the transmission of words than the Morse alphabet. Improvements are shown in galvanic batteries—one by which the consumption of material is greatly reduced. A copper spiral wire is introduced into the jar, which, by some unknown means, serves to retain the intensity of the copperas and zinc agents much longer than in the old jar.

The aggregate value of the various electric instruments and machinery entered by the various exhibitors is estimated at $12,000.—*Cinc. Gazette.*

THE ELECTRIC LIGHT.

Up to the present time, as is well known, the electric light has been used only for lighthouses, as an electric sun illumination for signals, or on the stage, where a strong light may be required without regard to cost; but thus far it has been quite impossible to employ it for lighting streets or houses. By the old method the electric spark was passed between two points of charcoal, each attached to a copper wire connected with an electro magnetic machine. The disadvantages attending this mode consisted in the facts that for each light a separate machine was required, and that the light so obtained, although very powerful, was impossible to be regulated, besides being non-continuous, owing to the rapid consumption of the charcoal points from exposure to the air. All these difficulties, Mr. A. Ladiguin, of St. Petersburg, Russia, has tried, and apparently overcome most successfully. By this newly invented method, only one piece of charcoal or other bad conductor is required, which, being attached to a wire connected with an electro-magnetic machine, is placed in a glass tube, from which the air is exhausted, and replaced by a gas which will not at a high temperature combine chemically with the charcoal. This tube is then hermetically sealed, and the machine being set in motion by means of a small steam engine, the charcoal becomes gradually and equally heated, and emits a soft, steady, and continuous light, which, by a most simple contrivance, can be strengthened or weakened at the option of those employing it, its duration being dependent solely on the electric current, which of course will last as long as the machine is kept in motion. Taking into consideration the fact that one machine, worked by a small three horse power engine, is capable of lighting many hundreds of lanterns, it is evident that an enormous advantage and profit could be gained by the illumination of streets, private houses, public buildings, and mines, with the new electric light. In the latter, it must prove invaluable, as no explosion need ever be feared from it, and these lanterns will burn equally as well under water as in a room. Without mentioning the many advantages this mode of illumination has over gas, which by its unpleasant odor and evaporation is slowly poisoning thousands of human beings, and from which explosions are frequent, we can state that, by calculations made, this electric light can be produced at a fifth of the cost of coal gas. We hope shortly to place before the public more complete particulars, as well as reports of further experiments which are proposed to take place in Vienna, Paris, and London.—*Golos, and Journal of Society of Arts.*

Is the Electric Current an Ether-Motion.—*By M. Antonio Roiti.*—As a test of the theory that the galvanic current is a motion of the luminiferous ether, M. Roiti describes an interesting experiment. If the theory is correct, the velocity of propagation of light in a body through which a galvanic current passes must vary with the direction of the current. The motion of the ether, in form of galvanic current in the body, will be added to that of the light waves, or subtracted from it, according to the direction; and such a difference may be observed in the interference-fringes of a ray of light. Solar rays, united in a focal line of a cylindrical lens, and made parallel by a spherical lens, were sent through a glass case having two divisions; pasing through two slits parellel to the focal line of the cylindrical lens, and about the thickness of the partition apart. In exit the two rays interfered, and interference-fringes were observed. The case contained a solution of sulphate of zinc and four amalgamated zinc plates, which served as electrodes. They rested against the front and back walls of the divisions of the case, but were somewhat narrower than these, that passage might be afforded to the light rays which went close by the partition. The electrodes were so connected with the battery that the current had opposite directions in the two divisions. The currents were gradually increased in strength, till at last twenty Bunsen elements were used. "The fringes were displaced but the displacement was slow, and *independent* of the direction of the current. It came always from that division which, containing a greater quantity of liquid, offered less resistance. In short, it was, no doubt, an effect of heat developed by the electric current. And when the resistances in both columns of liquid were made equal, I found it impossible to perceive any difference in the fringes, whether the circuit was closed or broken, or whether the plates were neared to each other or withdrawn. I must remark, however, that the fringes were very small, and that my apparatus did not permit of enlarging them; further, that the floor shook, from noises outside. But in no case was there displacement the breadth of a fringe. It may be inferred, that if the galvanic current is a flow of ether, the velocity of the ether must be very small; more exactly, if we take the velocity of light as 298,000 kilometres per second, the wave-length 0·0006 m.m., and the length of the entire column of liquid 90 c.m. (the case was 45 c.m. long), the velocity in question must be less than 200 metres in the second,—a result which makes the hypothesis very improbable."

In Russia, every endeavor is being made by the government to advance and diffuse knowledge in the arts and manufactures. With this object in view, fifteen exhibitions have, within the past few years, been held alternately at St. Petersburg, Moscow and Warsaw.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, OCTOBER 1, 1873.

THE TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

The acknowledgment of receipts and other matter pertaining to the insurance association, intended for this issue of the JOURNAL, is unavoidably delayed, but will appear in the next number.

We regret to announce the death, at half-past seven o'clock this morning, after a brief illness, of Mr. E. S. Keep, Manager of the Albany, N. Y., office. Mr. Keep, although a comparatively young man, was one of the oldest and most highly esteemed men in the service, of gentle and winning manners, and a thorough Christian gentleman. His early death will be deeply regretted by all who knew him, and his family will have the heartfelt sympathy in their great affliction of all in the service.

We publish on our first page an exhaustive article on the Measurement of Electro-Motive Forces, for which we are mainly indebted to the valuable work on electric measurements and electrical tables by Latimer Clark and Robert Sabine.

BLANK No. 26, requesting customers to call for dispatches, has been printed upon postal cards, and can be had by order upon the supply department.

Our supply of the edition of July 1st, 1873, is completely exhausted. Superintendents and others who may have extra copies of that date will confer a favor by forwarding them to this office.

The Anglo-American Telegraph Company contemplate the discontinuance, after January 1st, 1874, of their agency at New York.

All communications respecting accounts in error with the Long Branch, N. J., office for the months of June, July, August and September, should be addressed to Superintendent Hinchman, No. 145 Broadway, New York.

THE YELLOW FEVER AT SHREVEPORT, LA. FAITHFUL TELEGRAPHERS.

The yellow fever epidemic which appeared at Shreveport, La., in the early part of September, has been of the utmost severity, the deaths having averaged sixty per cent. of those attacked, thirty to forty dying daily. As many of the inhabitants who could, fled; but, at present writing, it is estimated that at least 1,000, out of a population of 3,000, are either sick or convalescing. In proportion to their number telegraphers have suffered exceptionally.

On the 16th President Orton received the following despatch from General Superintendent Van Horne, which shows clearly the condition of affairs in that unfortunate community:

"LOUISVILLE, KY., Sept. 16—2 o'clock.

"When the fever made its appearance at Shreveport we had there two operators besides the manager. One left immediately. George J. Rae, manager, and Thomas M. Jackson, operator, remained at their posts till stricken down. Mr. Jackson died on Saturday and Mr. Rae yesterday. Operator Buchanan, of Meriden, tendered his services, and reached Shreveport on Wednesday, but when Mr. Rae was taken sick on Thursday, Mr. Buchanan returned home, and is now ill there. Operator H. C. Davis came from New Orleans on Sunday, and is now alone on duty in the Shreveport office. Our repairer has the fever, but will probably recover. Alfred Saville, although unacclimated, has gone to help Davis, and will probably reach Shreveport to-night. Rae and Jackson are supposed to have been the main supports of their respective families. Rae's father is an invalid, and Jackson's mother is a widow. Our banker, Mr. George A. Pike, and operator Davis did all they could for the relief of Mr. Rae. Jackson died before Davis reached there, but he received kind attention from Mr. Pike. Nearly all who were able to leave the town have left, but there are fully 600 cases of fever there now, and the number of people who are well is not sufficient to take care of the sick. The fever is unusually fatal, and it is believed by many to be the Mexican *vomito*, and to have been introduced by the employees of the Transatlantic Circus. It attacked persons who had yellow fever in Shreveport in 1867. Contributions are coming in slowly from all parts of the country. Physicians and nurses are badly needed. The condition of the town is simply heart-rending, and the suffering is something fearful to contemplate."

Immediately upon the receipt of the dispatch from Mr. Van Horne, President Orton issued the following order to the superintendents of the Western Union Telegraph Company throughout the country:

"Instruct all the managers to send free messages relating to the relief of the citizens of Shreveport, and at the request of the Governor, or United States Senators of Louisiana, direct contributions of money to be received and transferred by telegraph without charge."

In New York, and throughout the country, contributions in money were freely made, and as rapidly as the funds were placed in the offices of the Western Union Telegraph Company, transfer was made at Shreveport, free of all charges.

The direct aid thus afforded by the Company is beyond computation, and their liberality will not soon be forgotten by the public.

The relatives and friends of Messrs. Rae and Jackson, who died at the post of duty, have the sympathy of the Company and of the whole fraternity in their affliction. Telegraphers will remember with pride that they have had associates whose faithfulness and devotion to duty arose superior to any feeling of personal danger.

The services of Messrs. Buchanan, of Meriden, Miss., Saville, of Memphis, Bernard, of Cincinnati, and Davis of New Orleans, who volunteered for duty at Shreveport, cannot be commended too highly. The fact that the three former were unacclimated, places their conduct in the more favorable light. Mr. Davis, as will be seen from the following letter from Superintendent Compton, is an old hand at fighting "Yellow Jack." These gentlemen have rendered good service in the cause of humanity, and have fully demonstrated their devotion to the interests of the Company. The epidemic is now slowly abating, and it is to be hoped that they will escape unscathed.

JACKSON, MISS., Sept. 16th, 1873.

To the Editor of the Journal of the Telegraph:

A noble example should not be suffered to remain in obscurity, or a noble deed go unrewarded. Two years ago, when the city of Natchez, Miss., was visited by that terrible scourge "yellow fever," Mr. Morris, our manager, was one of its many victims. H. C. Davis, one of our old operators (not then in the Company's service) volunteered to fill the place. Reporting at Natchez for duty, he was shortly prostrated by the disease, but recovered. The nearly unparalleled calamity that has this year fallen upon Shreveport, La., deprived the unfortunate citizens of the then much needed telegraph, and for some days the office was closed. Henry C. Davis (then employed in New Orleans), again taking his life in his hand, volunteered to go to Shreveport, a city plague-stricken—for yellow fever is no name for the malignant disease now raging, if the reports of persons falling dead in the streets is true. I know that young Davis seeks neither thanks nor reward, and doubt not but that he would shrink from a public notice of his noble act. Our fraternity have given many instances of self-sacrifice, yet, in an experience of 25 years, I do not remember of seeing or hearing of the thanks of a community, or the recognition by the Company, of such noble service.

J. COMPTON, *Asst. Supt.*

THE DUPLEX TELEGRAPH.—The American Institute of New York has awarded "The Great Medal of Honor" to Joseph B. Stearns, for the invention of the duplex telegraph, which has made a revolution in telegraphy in the United States, and has been adopted by the Postal Telegraphs in this country. The American Institute is a very old and eminent society and is understood to have made the present award after a most careful and exhaustive examination as to the novelty and value of the invention. Only two other medals of this class have been issued by the Institute since its foundation, the conditions upon which they were awarded being such as to exclude all inventions and improvements except those of the highest importance—viz., first, the machine or process must have superseded all others previously employed for a like purpose; second it must have created a revolution in the art or business in which it is employed.—*London Times, Sept.* 13, 1873.

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ADOPTION OF STEARNS'S DUPLEX SYSTEM BY THE BRITISH GOVERNMENT.

The British Postal authorities have adopted Stearns's Duplex Telegraphs, and are putting the apparatus on their lines as rapidly as possible. Mr. Culley, the Engineer-in-chief of the Postal Telegraphs, states, under date of August 18th, that the Postal Telegraph Department is using Mr Stearns's system on the following circuits:

London to Liverpool,
London to Manchester,
London to Bristol,
London to Birmingham,
London to Edinburgh,

with perfect success, and that he is preparing to extend the system to other important circuits as soon as arrangements can be made. Mr Culley also states that it has not been found possible to work satisfactorily circuits approaching one hundred miles in length in both directions at the same time except by Mr. Stearns's method.

Frank Ives Scudamore, Esq. C. B., the efficient Head of the Post Office Telegraphs, also states that Mr. Stearns's system of duplex working has been applied to the Wheatstone automatic instruments, used upon their circuits, with the best possible results.

The duplex is also being worked upon the lines of the Anglo-American Company between London and Valentia.

The following letter from Mr. Stearns appears in the money article of the London *Times* of September 1st.

"Sir:—In *The Times* of August 27 you call attention to a system of duplex telegraph,' by means of a condenser, which enables the operator to send messages through the cables in opposite directions at the same moment,' and that the electricians of the Eastern Telegraph Company had surmounted all obstacles and applied the system to certain of their cables, &c.

"As the system in question is mine, and mine alone, I cannot allow the credit of the invention to be given, even unintentionally, to others. Copies of my English patents were sent to the electricians of the Eastern Company some months ago, and my system explained to them by an officer of the Postal Telegraphs as long ago as last March, and I do not believe that they have knowingly claimed the credit of the invention. To the credit of 'surmounting the difficulties' in applying the system to their own cables, they are justly entitled certainly; but if they claim more they do me injustice. The system is secured to me by letters patent in Great Britain and the Colonies, in nearly every country in Europe, and in the United States. It as been adopted by the Postal telegraphs and is worked between London and all the larger cities in England, and its use is being constantly extended. It is also working upon the lines of the Anglo-American company, between London and Valentia, upon the prineipal lines in the United States, Canada, and Nova Scotia. I put it into successful operation upon cables 340 miles in length, between Cape Breton and Newfoundland, in August, 1872.

"It can be worked in connection with any of the old and well-known systems, like the Morse, the Needle, the Wheatstone, the Hughes type-printer, the Mirror, or any other, and this last circumstance adds greatly to its value, as all the apparatus now on hand, and in use by the various governments and Companies, can still be used by merely adding the Duplex attachments, which are not expensive.

"The system has not yet been successfully applied to long cables like the Atlantic, but I have no doubt that, with further experience, cables of any length may be worked.

"I am, Sir, your obedient servant,
"J. B. STEARNS.

"26 Old Broad street, Aug. 30."

ANNUAL MEETING OF THE GOLD AND STOCK TELEGRAPH COMPANY.—ELECTION OF OFFICERS.

The annual meeting of the Gold and Stock Telegraph Company was held at the office of the Company, 61 Broadway, in this city, on Tuesday, the 23d ult. The old Board of Directors was reëlected, with the exception of the substitution of Mr. George B. Prescott in place of Mr Horace F. Clark, deceased. The following constitute the Board for the ensuing year: Messrs. Tracy R. Edson, Wm. Orton, George B. Prescott, Joseph M. Cook, Marshall Lefferts, James H. Banker and Alonzo B. Cornell.

At a subsequent meeting of the Board of Directors, Marshall Lefferts was reëlected President, Tracy R. Edson was elected Secretary and Treasurer, and an Executive Committee, consisting of Messrs. Orton, Banker, Edson and Prescott, appointed.

TRUE SUCCESS IN LIFE.

By Ray Palmer.

In a few familiar, but pointed words, the author of this volume offers a series of friendly counsels to youthful readers on topics relating to the formation of character, and the responsibilities of life. The importance of self-culture is enforced by a variety of apt and judicious considerations, showing the duty of constant improvement in the intellect, and the heart, and in personal manners and bearing. The author laments over the small number of those who, after leaving school, take any systematic care to secure their mental growth. It is a great mistake, he insists, to suppose that intellectual pursuits should then entirely give place to the duties of active life. There cannot be a greater shame than thus to convert the beautiful possibilities of existence into a mere mechanical routine, in which there is the toil of motion, but no more progress than in a treadmill. He admits the difficulties of the case. It is not an easy thing for an apprentice or clerk to find time for the improvement of his mind. He is often obliged to give every moment from morning till night to the shop or the counting-room. But this is the fault of our prevailing system, and is wholly wrong. The eagerness for gain usurps the whole of life, and imprisons it in one dull round of care and toil. This devotion to Mammon is the ruin of the mind. Not less earnestly does the author urge the necessity of Christian principles to the accomplishment of the great purposes of life. True success can be attained only by obedience to the precepts of religion, and the struggles and discipline which belong to genuine goodness. In the preparation of this work, Dr. Palmer has shown himself the sincere and intelligent friend of youth. His counsels are temperate and judicious. He presents no false views of life, nor attempts to beguile the fancy by false and inflated eloquence. His language is as grave as it is earnest, and derives a peculiar impressiveness from the force of truth and freedom from pretence.

The United States steamer Tuscarora has sailed from Victoria, for Cape Flattery, to commence soundings for the cable to Japan.

LETTER FROM PRESIDENT ORTON, CORRECTING ERRONEOUS STATEMENTS IN THE NEW YORK TIMES.

The New York *Times* of September 17, contains the following letter from President Orton:

"An editorial in The Times of the 9th inst., headed "Stock Watering," contains the following: "(1) In the United States, telegraphing to the private individual is dearer than in most civilized countries, and so dear as to prevent largely its use except for business purposes. (2.) The average charge of the Western Union Company in 1872 was seventy-two cents for each message. (3.) This enabled the Company to pay six and a half per cent. dividend on the nominal capital. (4.) But if the capital had not been watered, and represented the actual cost of the property, the Company could have reduced their rates to an average of twenty-four cents, and still paid six and a half per cent dividend." Believing that you do not intend to do an injustice to the Western Union Company, nor to give currency to erroneous impressions concerning the telegraph business of the United States, as compared with that of other countries, I ask permission to reply to the statements above quoted, as follows:

1. Sixty per cent of the cost of carrying on the telegraph business of the Western Union Company is paid for labor. The wages paid are more than double the rate allowed by the Governments which control the business in other countries. Wire, and nearly all other materials used in constructing and operating telegraph lines in the United States, cost from forty to sixty per cent. more here than in any European country. Ten miles of line must be erected and maintained in the United States to reach the same number of population that in Europe may be reached with one mile. Taking these facts into account, it seems clear that the telegraph service is necessarily much more expensive in the United States than in Europe. But, notwithstanding the less favorable conditions under which the business is carried on, the average message costs no more in the United States to-day than it does in Europe.

2. The receipts of the Western Union Company per message in 1872 were not seventy-two cents, as stated, but sixty-two cents. The average receipt per message of all the Governmental telegraphs in Europe for the year 1870 was forty-five cents. This was the average per message paid by those who used the telegraph. But the average cost per message to the Governments which carried on the business was sixty-one cents, the deficiency having been paid by taxation. Since 1870, the average cost per message in Europe, whether to the sender or to the Governments which carry on the business, has not been reduced. On the contrary, the excess of expenses over receipts seems to be increasing, and in order to check this tendency and to lessen, if possible, the annual deficit, the French Government last year advanced the rates on messages in that country from twenty to forty per cent., and I venture the prediction that an advance of rates will be made by other European Governments within a short time. The managers of the Western Union Company have not failed to give to the subject of message rates the most careful consideration. They have desired to give the public the benefit of rates as low as appeared consistent with their duty to the stockholders. In the Fall of 1869 the attempt was first made in this country to establish a telegraphic tariff system, based on air-line distances. In consequence of the reductions then made the receipts for 1870 were less by about $200,000 than for the preceding year, while the expenses were increased more than $300,000, and the net profits diminished more than $500,000.

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There was an increase of over 1,000,000 in the number of messages sent. A year later another important reduction was made by the establishment of the night message system at half rates. On the 1st of February, 1873, $2.50 was made the maximum rate for messages between all points on the Western Union Lines. This was equivalent to a reduction of fifty per cent. on the entire telegraphic business between the Atlantic and Pacific coasts. The reduction was also quite large on the rates between the Southwestern and Northeastern States, and between the stations west of the Mississippi and Missouri and those in the Atlantic States. On the 1st of July, 1873, a further reduction was made by the more complete substitution of the air-line system of rates, first introduced in 1869. As a result of these reductions the average rate per message in the United States for the year 1873 will be considerably less than in 1872. I have just completed an examination of the reports for the month of July last, which shows that the average receipt per message was fifty cents, and this average is not likely to be exceeded hereafter.

3. The Western Union Company did not pay a dividend of six and a half per cent. either on its nominal or actual capital for or during the year 1872 No dividend whatever has been paid to the stockholders of this Company during the last three years.

4. The question whether the capital has been watered, or represents the actual cost of the property does not, therefore, seem to have any bearing upon the rates charged during that period. But if the rate had been an average of twenty-four cents per message, instead of enabling a dividend of six and a half per cent. to be paid on the actual cost of the property, as you state would have been the result, we should not have received sufficient revenue to pay the expenses of conducting the business.

I have now before me an exhibit of the cost per message for operators' and messengers' salaries for the last five years, as follows: 1869, 28 cents; 1870, 26½ cents; 1871, 25 cents; 1872, 24½ cents; 1873, 23½ cents. The cost per message of the messenger service has not varied more than one-quarter of a cent during this time,

The cost per message of maintaining the lines, exclusive of superintendence, that is to say, the labor and material expended in reconstruction and repairs during the same period, is as follows: 1869, 8¾ cents; 1870, 8¼ cents; 1871, 7¾ cents; 1872, 7½ cents; 1873, 9¼ cents.

It will be seen by this exhibit that no amount of telegraphic business which it would have been possible to handle would have yielded at twenty-four cents a message sufficient money to pay the salaries of operators and messengers, and the cost of maintaining the lines.

Any considerable increase in the number of messages involves the provision of additional wires, and as the mileage of poles and wires increases, the aggregate cost of maintenance increases, so that the cost per message of maintaining 100,000 miles of wire is not materially reduced when the mileage of wire and the number of messages have been increased fifty per cent.

I have said nothing of other expenses quite as inevitable in the conduct of the business, such as printing and stationery, rent, light and fuel, office furniture, instruments and battery, law expenses and damages, and State and local taxes.

The facts connected with the growth and conduct of telegraphic business in the United States and other countries are so important as to merit more careful study than has heretofore been given, and I am glad to see that *The Times* is disposed to consider them. One of the first results of intelligent and impartial investigation of this subject will be to satisfy the inquirer that the cost per message of sending telegraphic communication by any of the processes now employed is much greater than has been supposed, and that the cost does not diminish in the ratio of the increase in the number of messages.

Whatever mistakes may have been made, the present managers of the Western Union are not liable to public censure either for "stock watering" or for the payment of excessive dividends to stockholders, as they have neither increased the capital stock nor made a distribution of profits. But they have done this: They have constructed more miles of telegraphic line and wire than all other parties in the United States in the same time, have steadily reduced their rate of charges, and have improved the character of the service, and the figures for July, 1873, which I have given, show that they now charge on the average eleven cents less per message than the average cost of transmitting a message on the Continent of Europe in 1870.

Very respectfully,

WILLIAM ORTON.

EXECUTIVE OFFICE, WESTERN UNION TELEGRAPH COMPANY, NEW YORK, Sept. 16, 1873.

VIENNA IMPERIAL ACADEMY OF SCIENCE.

Professor A. de Waltenhofen has established, by the aid of the calculus, the following theorem:—The magnetizing power of a spiral is proportional to the product of the intensity of the current multiplied by the sum of the cosines of all the angles formed by the axis of the magnetized coil and the right lines directed towards the extreme points of this axis from a point on each turn of the spiral, situated in the plane of the axial section. This theorem is available only in the supposition that the axis of the magnetic coil is in the same direction as that of the helix and that the intensity of the current does not exceed limits within which it remains proportional to the electromagnetic force. This theorem confirms and explains the results of the experiments of MM. Lenz and Jacobi on the relations between the electro-magnetic power and the number, amplitude, and arrangement of the turns of the metallic wire. The construction proposed by M. Haedenkamp for the attractive action, and that proposed by M. Wazsmuth for the magnetizing action of a spiral, are both only particular applications of the theorem of Waltenhofen. The sum of the cosines of a cylindrical spiral, calculated according to this theorem, serve to determine the relation between the magnetizing power of two given spirals, and here again the results of calculation coincide with those of experiment.

MM. Boltzmann and Roimch have proceeded with their experimental researches on dieletric constants of insulating bodies, using for this purpose an electromagnetic diapason, the oscillations of which charged at short intervals alternately with positive and negative electricity, the conducting ball of which they wished to find precisely the action on the dielectric ball. They have been able also to eliminate that disturbing cause termed by Faraday electric absorption, and to obtain constants sufficiently concordant with those deduced from experiments with the condenser, as the following comparative table shows:—

DIELECTRIC CONSTANTS.

Substances.	By the mutual action of the balls.		By the Condenser.
Sulphur	3.857	3.904	3.84
Hard Gum	3.550	3.400	3.15
Parrafline	2.310	2.280	2.32
Colophane	2.450	2.470	2.55

TRANSATLANTIC LONGTITUDES DETERMINED BY THE U. S. COAST SURVEY.

A paper read before the American Association for the Advancement of Science, at Portland.

The exact determination of the longitude of some point in the Coast Survey, from the principal observatories of Europe, is a matter of the first importance. The methods of moon culminations, of lunar occultations, and of chronometer transportation, formerly employed, yielded results whose degree of accordance still left much to be desired. The success of the transatlantic cable rendered it possible to use the telegraphic method, which was promptly done in 1867, when the longitude between Harvard College Observatory and Greenwich was determined, under the direction of Dr. B. A. Gould, through the Ireland-Newfoundland cables. When the French cables from Brest to St. Pierre, and thence to Duxbury, were laid, a second determination was made, under the charge of Assistant G. W. Dean, in 1870, in order to check the accuracy of the method; but as no cable was then laid between Brest and England, the link to connect with Greenwich was still wanting, and, carrying it by the French longitudes to Paris, and thence to Greenwich, an indifferent agreement with the former value was obtained. The missing link was supplied in 1872 by Prof. J. E. Hilgard, who at the same time repeated the transatlantic determination. The plan of operations was to receive at Brest simultaneously the time signals from America, from Greenwich and from Paris; thus referring the American station at once to both observations, and obtaining at the same time the difference of longitude between the latter. Next, the Brest observer successively visited, with his own instruments, all the other stations, in order to compare personal equations, and while at Greenwich he exchanged time signals with the Paris observers, thus making an independent determination of that longitude through another cable.

The following is a comparison of results:

	NIGHTS.	M.	SEC.
Brest—Greenwich	6	17	57.13
Greenwich—Paris	5	9	21.11
Brest—Paris (sum)		27	18.24
Brest—Paris (direct)	9	27	18.18

showing a difference only of 0.06 seconds, which is to be equally distributed between the several values. The French determination, by telegraph, of Brest—Paris, made in 1863, is within 0.01 second the same as above, while that of Paris—Greenwich, made earlier, is 0.46 seconds less than the value now found. It is a singular combination of circumstances, which led to the correction of the longitude between the two principal observatories of Europe by American astronomers.

For the longitude Harvard-Greenwich we have now three independent results, obtained in different years, by different observers, and through different cables; for in 1870 the two cables were joined at St. Pierre; and the signals exchanged directly between Brest and Duxbury, while in 1872 an intermediate station was made at St. Pierre, whence the signals were sent, *viâ* Sydney and the provinces, to Cambridge. The results are:

LONGITUDE HARVARD OBSERVATORY FROM GREENWICH OBSERVATORY.

	H.	M.	S.		H.	M.	S
1867	4	44	31.00	1872	4	44	30.99
1870	4	44	31.05				
Mean					4	44	31.01

The close agreement of these results indicates a very near approximation to the truth, and this fundamental longitude may now be considered as settled. Adding to the above value the difference in time between the Washington and Harvard Observatories, 23 minutes 12.12 seconds, we get for Washington 5 hours 8 minutes 12.12 seconds.

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DEPOSIT ON ZINC.—At a recent meeting of the Chemical Society, a paper, "On the Nature of the Black Deposit in a Copper Zinc Couple," by Dr. J. H. Gladstone, F. R. S., and A. Tribe, F. C. S., was read. As it had been suggested that the black deposit referred to contained more or less metallic zinc, the authors had instituted experiments to ascertain the truth of the matter. When the solution of copper sulphate is poured on the zinc, a deposit of pure copper is produced as long as the solution contains any of that metal. As soon, however, as the copper is exhausted, other reactions supervene : zinc oxide is formed by the action of the oxygen dissolved in the water, and metallic zinc is also deposited. Such a black deposit examined under the microscope is seen to consist of branches of crystalized copper studded with crystals of metallic zinc, the latter of which at once disappear if washed with a solution of copper sulphate. It would therefore appear that the black deposit on the copper-zinc couple as usually prepared, can contain little or no metallic zinc. After the reading of the paper, Dr. Russell said that the statement, that as long as there was excess of copper sulphate in solution no zinc was deposited along with the copper on the zinc plate, was at variance with certain experiments he had made some time ago. When a zinc plate is immersed in a dilute solution of copper sulphate, it immediately becomes covered with a black deposit; but if the plate be moved about in the liquid so as to remove it from the solution of zinc sulphate formed in contact with it, the deposit immediately acquires a red color. The black deposit, moreover, evolves hydrogen when treated with acid, whilst the red does not. Dr. Müller remarked that iron plunged into a solution of sulphate of copper gives at once a red deposit; moreover, any metal appearing black from being in a minutely divided state acquires its proper color on being rubbed with an agate burnisher, but this black deposit does not. Dr. Wright observed that, *a priori*, it was quite possible that zinc and copper should be deposited together, since brass could be electro-deposited.

A DOGMATIC DEFINITION OF THE TELEGRAPH.—"Sam," said a darkey to his ebony brother, "how am it dat dis yaa telegraf carries de news from dem wires?" "Well Cæsar, now s'pose dar am a dog free miles long." "Nebber was such big dog; don' b'leib dat!" "You jess wait minit; I'se only illustratin', you stupid nigger. Now, dis yaa dog, you see, jess puts his front feets on de Hoboken sho', and he puts his behind feets on de New York sho'." "Yesser." "Now, s'pose you walk on dis yaa dog's tail in New York—" "Yesser." "He'll bark, won't he?" "Yesser." "Well, where will dat dog bark?" "In Hoboken, I calc'late." "Dat am jest it. You walk on de dog's tail in New York, an' he bark in Hoboken; an' dat's de way de telegraf works." "Yesser; dasso—dasso! You's right, by golly,"

RECOVERY OF THE BROKEN BRAZILIAN CABLE.

The section of the cable between Lisbon and Madeira, which was broken while being laid, has been recovered and repaired. On the 22d ult. the shore end of the line was successfully laid at Madeira, and telegraphic communication is now perfect between the two points.

The Western Union Telegraph office transmitted 80,248 words of press report during the session of the Republican State Convention in Worcester, Wednesday. Mr. Bradford, the manager of the office, is entitled to much credit for the manner in which he handled this great rush of business.—*Boston Journal*, 12*th*.

WATTS & COMPANY,

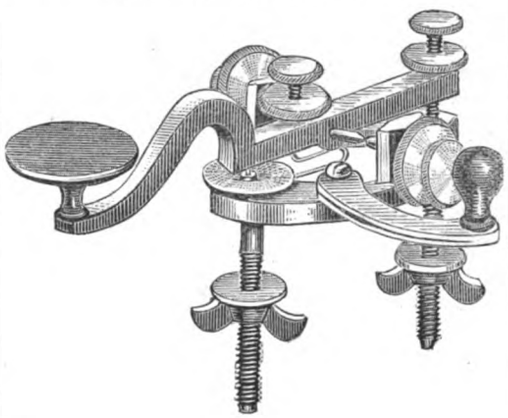
47 Holliday Street,

Baltimore, Md.,

SOLE MANUFACTURERS OF THE

PATENT CIRCUIT-CLOSER KEY,

Which has met with marked success.



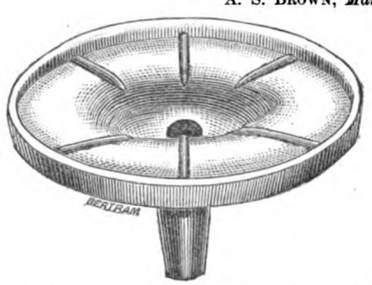
Price, $5 50 plain; $7 nickel-plated.

The following is from a competent judge, written after some weeks' trial.

145 BROADWAY, NEW YORK, Sept. 22d, 1873.

DEAR SIR,—Your circuit-closing attachment on the key, left with me for trial, is pronounced by all who have used it a decided and much-needed improvement on the common form.

Respectfully,
A. S. BROWN, *Manager.*



The Best Form of Battery Insulator Offered.

SIMPLE AND PERFECT.

Made of porcelain, handsome in appearance. Occupies little more space than the cell it supports. Each cell of battery completely isolated. Leakage is reduced to the minimum by the use of it.

General Superintendent Van Horn, Southern Division W. U. Tel. Co., writes of it:

"We have now in use a thousand or fifteen hundred of your battery insulators, and expect to order many more before the close of the year.

We have never used any battery insulator that equals it in any respect. In fact, it appears to be as near perfect as we can reasonably expect, in a contrivance for that purpose."

Price 40 cents.

We offer a very excellent article of Galvanized Wire, superior to any in the market. The linemen on Baltimore and Ohio R. R. say they have never seen its equal for toughness and flexibility.

Special attention given to building.

Estimates given for any amount of material for telegraph construction or extension.

SWITCHES, GALVANOMETERS, RESISTANCE COILS, &c., to order.

Designs for Switch Boards for special service furnished.

SCOTT'S PATENT ANNUNCIATOR,

for Hotels and Residences.

PENSACOLA TELEGRAPH CO.

C. L. L BARON, *President.*

CHARLES LE BARON, JR., *Sec'y and Treasurer.*

PENSACOLA, FLORIDA.

OFFICES IN

PENSACOLA, FLA. FERRYPASS, FLA.
MOLINO, FLA. MILTON, FLA.
PENSACOLA JUNCTION, FLA. BAGDAD, FLA.

Connect with the lines of the WESTERN UNION TELEGRAPH COMPANY at Pollard, Ala.

Governed by the same Rules and Regulations as the Western Union Telegraph Company.

WATTS & COMPANY,

47 Holliday Street,

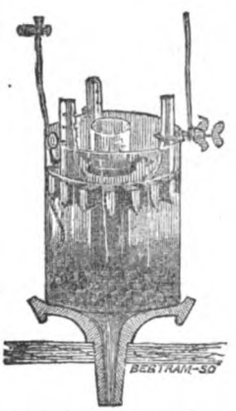
Baltimore, Md.,

MANUFACTURE

Telegraph and Electrical Instruments

OF EVERY DESCRIPTION.

Facilities for supplying any description of Machinery or Material equal to any in the United States.



Patented Dec. 31, 1872.

OVER SIX THOUSAND cells of the Baltimore Battery in use by the Gold and Stock Telegraph Company of New York in their Private Line Department, is a sufficient acknowledgement of its merit, as a form of the gravity battery, combining the valuable principles of

Economy, Cleanliness and Constancy,

"—in fact a base-burner."

F. L. POPE,
Telegrapher, July 5th, '73.

SELF-FEEDING,

No Sulphate of Copper can reach the Sulphate of Zinc Solution.

The shape of Zinc and Copper, which, with the tube, were patented December 31st, 1872, secures the largest surface with least weight of the metals. Half pound sulphate copper per month, ample supply for No. 2, or 3.

Following is one of the many letters we have from reliable telegraphers:

PIEDMONT, W. Va., September 28th, 1873.

Messrs. WATTS & Co.,
Baltimore, Md.

GENTLEMEN:—On January 1st, 1873, I put up 75 cells of your No. 2, Baltimore Battery, in place of 40 cells of carbon, from which two railroad wires of 100 miles each, are supplied. It has not since been taken down or cleaned, and has required no attention, except to fill the tubes with blue stone, once each month, and replenish the fluid once or twice during this period, made necessary by evaporation.

I am fully convinced, from long experience, that this is superior to any other form of the gravity battery.

It has now been in constant use for nine months, and will not need new zinc until after January next.

Respectfully,
J. G. NESBITT, *Manager.*

ORDERS FOR THIS BATTERY PROMPTLY FILLED.

A large stock constantly on hand.

No. 1 for Electro-motors, R. R. signals or similar service,	$2.25
No. 2 ordinary local or Printing Telegraph main	$1.75
No. 3 ordinary main	$1.25

A very Superior Main Line Sounder.



Brass, $22.50. Nickel-plated, $25.00.

For wrecking purposes or temporary offices, this instrument is without a rival.

A perfect combination, handsome, good-sounding instrument.

NO LOCAL REQUIRED.

Well seasoned black walnut box, large enough for pencils, paper, plyers and office wire, in addition to the instrument, $4. Larger size for climbers, vises, &c., $5.50.

RELAYS, SOUNDERS AND KEYS,

always on hand, plain or plated.

Our Challange Sounder is the noisest instrument made.

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THE BEST TELEGRAPH MATERIAL IN THE WORLD

IS SUPPLIED BY

L. G. TILLOTSON & CO.,

8 Dey Street, New York,

MANUFACTURERS, DEALERS and IMPORTERS

OF

TELEGRAPH MACHINERY, SUPPLIES

AND

Line Equipment of every Description.

MATERIAL AND INSTRUMENTS

always on hand, for the equipment of lines of any length, at a moment's notice.

We furnish first-class goods at low prices. Liberal arrangements made with Superintendents, Contractors and Builders of Telegraph Lines.

Registers	$38 00 to $45 00
Spring Registers	47 50 .....
Relays	14 00 to 18 00
Sounders	3 50 to 7 50
Keys	4 00 to 6 50
Main Line Sounders	14 00 to 18 00
Combination Sets	20 00 to 30 00

Galvanometers, $7 00 upward.

POCKET INSTRUMENTS, Nickel Plated, in Hard Rubber Cases, 1¾x2x5 inches.

CUT-OUTS, Plug, Peg or Button, with or without Lightning Arresters, for one, two or more Lines.

JONES' PATENT LOCK SWITCHES, the best and cheapest in use, with or without Lightning Arresters.

PEG or PIN, CULGAN, REPEATING, GROUND, LOCAL, BATTERY and SINGLE BUTTON SWITCHES.

LIGHTNING ARRESTERS for any number of wires, of most approved patterns.

Electro-Magnets,
Permanent Magnets,
Apparatus for Students and Amateur Telegraphers,
Electric Motors,
Printing and Dial Instruments,
Electrical Annunciators,
Fire and Burglar Alarms,
Electro-Medical Instruments.

RHUMKORFF COILS, from ¼ to 10 inch spark.

GEISSLER'S TUBES, from $1.00 upward.

ELECTRICAL CALL AND ALARM BELLS in great variety, from $6.50 upward.

INSTRUMENTS furnished, Nickel Plated, at 20 per cent. advance on List Prices.

OFFICE WIRES, from 80c. to $1.25 per pound.

GUTTA-PERCHA COVERED WIRES, all sizes.

BISHOP'S NEW COMPOUND COVERED WIRE, for running into offices, 4c. per foot.

MAGNET WIRES, in Silk and Cotton, at Factory prices.

INSULATED WIRES for special purposes made to order.

SILK COVERED SWITCH CORD, one, two or more conductors.

PATENT MESSAGE HOOKS, the best ever introduced, prices 65c. and 75c. per dozen.

MANIFOLD PAPER and AGATE STYLUS at bottom prices.

Cables and Submarine Wires.
Repairers' Tools and Tool Bags.
Glass and Rubber Window Tubes.
Insulators of every Description.
Brackets, Pins and Spikes.

HILL, CALLAUD, GROVE, BUNSEN, CARBON, DANIELLS, LE CLANCHE, NITRO-CHROMIC, AND OTHER STYLES OF BATTERY IN ANY QUANTITIES.

PURE CHEMICALS AT LOWEST PRICES.

SULPHATE OF COPPER A SPECIALTY, AND PRICES VERY LOW.

CARBON PLATES made to order for Grenil, Smee, Stohrer and other Batteries.

OFFICE FIXTURES AND BATTERY UTENSILS OF EVERY DESCRIPTION.

"Smith's Manual of Telegraph," - - - - 30 cents.

ALL STANDARD WORKS on ELECTRICITY AND TELEGRAPHY.

SOLE AGENTS FOR

RICHARD JOHNSON & NEPHEW'S celebrated LINE WIRE.

Catalogue and Price List furnished on application.

L. G. TILLOTSON & CO.,

8 DEY STREET, NEW YORK.

F. L. POPE & CO.

Manufacturers and Dealers in

Telegraph Instruments and Supplies

OF EVERY DESCRIPTION,

38 Vesey Street, New York.

New and Superior patterns of

STANDARD TELEGRAPH INSTRUMENTS.

Their RELAYS, SOUNDERS, and KEYS which have been specially designed by Mr. F. L. Pope, are elegantly designed, thoroughly well finished and scientifically adapted to the service required and are recommended as SUPERIOR TO ANY HITHERTO OFFERED.

In addition to these ALL DESCRIPTIONS OF TELEGRAPH MATERIALS AND SUPPLIES are furnished, such as

INSULATORS, BATTERIES,
INSULATED WIRES,
CHEMICALS., ETC. ETC.

MAGNETIC AND DIAL INSTRUMENTS.

We have for sale also THE NONPAREIL TELEGRAPH INSTRUMENT for amateurs, learners and short lines.

A COMBINATION SET, comprising Sounder and Key on a handsome rosewood base.

Bradley's Box Relays and Sounders.
Bradley's Apparatus for Electrical Measurement.
Bradley's Naked Wire Helices and Magnet Spools to order, any desired size and resistance, at manufacturers' lowest price.

Descriptive Circular and Price Lists forwarded upon application to

F. L. POPE & CO.,

P. O. Box 6010 *38 Vesey St., N. Y.*

THE LECLANCHE BATTERY CO.

Offer for Sale this celebrated Battery,

(SECURED BY LETTERS PATENT,)

Of which they are the exclusive owners in this country.

Over 300,000 are now in use in Europe,

and have recently been adopted by the French Government in preference to the Calland, which had been used by them for several years.

WE RECOMMEND THEM FOR

Telegraphy (open circuit), Railroad Signals, Hotel Annunciators, Burglar Alarms, Electric Bells, Clocks, &c.

AMONG ITS NUMEROUS ADVANTAGES ARE—

ABSENCE OF ACIDS AND SALTS OF COPPER,
ITS GREAT CLEANLINESS,
WONDERFUL DURABILITY,
ECONOMY IN RUNNING EXPENSES,
ENTIRE ABSENCE OF ODOR.

This Battery will last without any attention from six months to three years.

A large number of Cups are already in use in this country on Burglar Alarms, Electric Bells, &c., and are giving entire satisfaction. The Western Union has a number of Cups put up November 26th, 1872, that are still running.

For further particulars apply to

THE LECLANCHE BATTERY CO.,

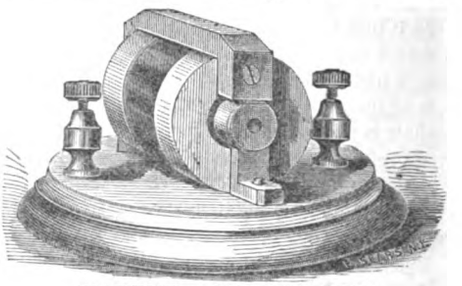
No. 40 West Eighteenth Street.

L. G. TILLOTSON & Co., Sole Agents,

No. 8 Dey Street, New York.

SOMETHING NEW.

"The Rattler" Telegraph Sounder.



(PATENT APPLIED FOR.)

This is a very simple and effective Instrument, and, as it does not require any spring to draw the lever back, is always adjusted.

PRICE, - - - - $3.50.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N. Y.

TILLOTSON'S

MAIN LINE SOUNDERS

AND

BOX RELAYS,

NICKEL PLATED OR IN BRASS.

Illustrated on page 64 of our Catalogue.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N. Y.

TILLOTSON'S

NICKEL PLATED INSTRUMENTS.

We furnish all our machinery Nickel Plated at a small advance over the price of the same articles in Brass.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N Y.

GEO. H. BLISS & CO.

SUCCESSORS TO

BLISS, TILLOTSON & CO.,

41 *THIRD AVENUE,*

CHICAGO, ILLINOIS,

MANUFACTURERS AND DEALERS IN

Telegraph Machinery and Supplies,

GALVANIZED AND PLAIN WIRE,

INSULATORS,

AND EVERY DESCRIPTION OF

OFFICE AND BATTERY MATERIAL

ALWAYS ON HAND.

INSTRUMENTS REPAIRED AT SHORT NOTICE.

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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 22. NEW YORK, OCTOBER 15, 1873. WHOLE NO. 143.

WESTERN UNION TELEGRAPH CO.

ANNUAL MEETING.

The Annual Meeting of the Western Union Telegraph Company was held at the Company's office, 145 Broadway, New York, October 8th, on which occasion a large proportion of the capital was represented. The following report was presented by Hon. WILLIAM ORTON, President of the Company :

REPORT OF THE PRESIDENT.

To the Stockholders of the Western Union Telegraph Company :

I have the honor to submit the following report of the operations of the Company for the fiscal year ending June 30, 1873, and of the condition of its affairs on that day. The capital stock of the Company at the close of business on that day was $41,073,410, of which there was outstanding $33,778,175, and owned by the Company, $7,295,235. The debt of the Company on that day was $6,038,410, of which there was due Oct. 1, 1873, for American Telegraph Company bonds, $89,500 ; in November, 1875, for Western Union currency bonds, $4,448,900; in 1902, for Western Union gold bonds, $1,500,000.

The gross receipts of the Company for the year, from all sources, were $9,333,018.51 ; the gross expenses, $6,575,055.82 ; and the net earnings, $2,757,962.69.

This amount has been applied as follows :

Construction and purchase of new lines	$1,342,905 97
Interest on bonds	317,793 00
Real estate	62,214 40
Purchase of sundry stocks of Telegraph Companies in Western Union Company's system	41,576 69
Paid for $50,000 Western Electric Manufacturing Company's stock	39,000 00
Patents (on account of Stearns Duplex)	19,268 00
Miscellaneous	402 50
Total	$1,72 ',450 56
The balance has been carried to the credit of income account	1,035,512 13
Total	$2,757,962 69

On the 1st day of July, 1872, the Company operated 62,032 miles of line, 137,190 miles of wire, and 5,237 offices. At the close of the year ending June 30, 1873, it operated 65,757 miles of line, 154,471 miles of wire, and 5,740 offices. The increase during the year has been 3,725 miles of line, or 6 per cent.; 17,281 miles of wire, or 12.5 per cent., and 503 offices, or 9.5 per cent. For the construction, reconstruction and repair of lines, there were used 141,498 poles, 261,715 cross-arms, 1,033,270 insulators, and 1,100,265 pins and brackets. There were in the employ of the Company, on the 30th of June, 1873, 9,190 persons. Of these, four were general superintendents of divisions, 29 superintendents of districts, 5,514 managers and operators, 1,830 messengers, 661 clerks, 589 foremen of construction and repairmen, 116 mechanics in factories, 84 battery-men, and 275 miscellaneous. There were in use on the lines of the Company at that date 6,350 sets of instruments for reading by sound, 1,878 recording instrument, 8,601 relay magnets, 8,905 transmitting keys, 227 repeaters, 15 printing instruments, 94 sets of duplex instruments, 2,662 switch-boards, 3,472 cut-offs, 3,029 lightning arrestors, 21,777 cups of main battery, and 11,717 cups of local battery. The cost of new instruments and apparatus supplied during the year was $140,877.52, and of battery material and supplies, $146,793.68.

The number of messages transmitted during the year ending June 30, 1872, was 12,444,499, and for the year ending June 30, 1873, 14,456,832, being an increase of 2,012,333, or 16.1 per cent. This includes press reports reduced to messages on the basis of 30 words to each message. The average toll collected upon each message for the last year was 61 cents, the average cost of transmission 42 cents, and the average profit per message 19 cents.

REPAIRS AND RECONSTRUCTION.

During the past year, $706,789.58 were expended for repairs of line, and $632,753 for reconstruction, making a total expenditure for maintenance of line of $1,339,542.58, an increase over the previous year of $409,537.41, or 44 per cent. The increase during the past year in the cost of maintenance of line is mainly for reconstruction, the cost of which was $354,213.28 in excess of the previous year. This increase is principally confined to the Eastern and Western States, and much of it is of an exceptional character, and I hope not likely to recur. Severe storms have prevailed, particularly in January and March, causing great injury to the lines and necessitating large outlays for repairs. Great expense has also been incurred in the removal of lines to accommodate railroad extensions, additions of tracks and sidings, and the removal and erection of buildings, principally on the Pennsylvania Central, New York Central, and Lake Shore railroads, and to a considerable extent on many other railroads in the Eastern and Western States. The annual cost of maintenance of the plant for the past five years has been as follows : Cost of maintenance per mile of line—1869, $14.50 ; 1870, $15.30 ; 1871, $15 ; 1872, $16.59 ; 1873, $20.37. Cost of maintenance per mile of wire—1869, $7.23 ; 1870, $7.72 ; 1871, $7.23 ; 1872, $7.67 ; 1873, $8.66. The cost of reconstruction was heavier than usual in the Eastern States, on account of the large number of poles which required renewal during the past year.

The maintenance of the plant in the best possible state of efficiency is a necessity which will be readily appreciated, as the capacity of the wires for the transmission of messages, and consequently for earning money, depends upon their condition for work in all weather. While every effort has been made to keep the cost of maintenance down to the lowest practicable limit, the average cost per mile has not materially changed during the past five years, and it is not likely that the annual expense will be materially less per mile for the next few years.

Great pains have been taken, during the past seven years, to secure a better and more durable kind of timber for the poles than was formerly used, and it is hoped that the cost of reconstruction will hereafter be somewhat decreased.

In Europe a cheaper class of timber is employed for poles, which are treated with sulphate of copper or creosote to make them more enduring, but investigation shows that the duration of the treated poles in Europe is no greater than that of our best natural timber. The lines which we are now reconstructing were built before the consolidation, and are inferior to those which we are now building, and when reconstructed they are better than when originally built.

It has been the policy of the Company, under its present management, in the direction of repairs and reconstruction, not merely to effect such repairs as would enable the lines to be worked, but to put them in better condition than they had been in before, keeping always in view the inevitable growth of the business, and the constant necessity for providing additional facilities. To illustrate : A line of poles bearing three wires require renewal; they are replaced by poles capable of bearing a dozen wires, and which will last twice as long as the old ones. If only the three wires are placed upon these poles, the whole outlay is charged to profit and loss, although the value of the renewed line is much greater than that of the one replaced when the latter was new. As additional wires are put up on such poles, the cost, merely, of such additions is charged to construction. Under this policy the whole property of the Company is improved every year more than that year's portion of natural decay ; so that the apprehension, sometimes expressed, of what appears to be the natural result of annual deterioration of the Company's property is groundless. The average condition of the whole property is better at the end of every year than at the beginning.

MONEY TRANSFER SERVICE.

On the first of July the transfer system had been in operation 21 months, with very satisfactory results. The increase of the business has been greatly beyond the expectation of its results when established. The revenue of the Company from this source for the first nine months was $8,936 ; for the same nine months, one year later, it was $45,811, an increase of more than five-fold. The revenue from this service, during the past year, was $58,000 ; the number of trasfers, 20,000 ; the amount transferred, $1,602,000. The average amount of each transfer was about $80. Ninety-two new money order offices have been opened during the year. The service has increased in promptitude and efficiency, and measures are now in progress which, it is expected, will still further improve it. Judging of the future by the past, it is not easy to estimate the growth of this business, or to appreciate the results which it may ultimately reach. If the same rate of increase is

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maintained during the present year that has been developed during the past twelve months, our monthly revenue from transfers will be over $8,000, or at the rate of $100,000 per annum. It is a gratifying and healthy feature of the business, that while the number of transfers is increasing rapidly, the average amount transferred is diminishing; for, as the average amount of transfers grows smaller, the risk of loss diminishes, and the profits of the business are proportionately greater. Experience seems to prove that our transfer system is the best that can be devised. The alterations in the details that have been found advisable since its inauguration have been few and unimportant, while an enlarged knowledge of the business, and familiarity with its working, seems to indicate the necessity only of a rigid adherence to all the regulations established in order to make its operation a complete success.

FREE MESSAGES.

The free messages, so classified in our accounts, transmitted by the Company during the past year, amount, at regular toll, to $766,000. Of this sum, $565,000, or 72 per cent., was performed for railroad and other transportation companies, all of which render us similar service in return. Without this service our lines could not be kept up so cheaply, nor our business so well conducted. Such messages are not free business in the proper sense of the term. They are sent under contracts which stipulate to give the Company an equivalent in right of way, transportation of men and material, and labor to maintain and operate our lines. While the contracts vary in terms they are in the aggregate very favorable to this Company. Of the balance of the free service, $83,000 worth is performed for the directors, officers and operators of the Company; $22,000 on account of rent; $18,000 for connecting telegraph companies; $58,000 for complimentary, and $20,000 for miscellaneous messages. The $83,000 of Western Union business includes the telegraphic correspondence of all the officers and agents of the Company. It has been the constant effort of the management to curtail this business, and the figures now reached are believed to be low and reasonable. The rent account explains itself. The items thus charged are generally limited to a specific sum per month, and the total business is constantly and carefully scrutinized. Instead of paying in cash we pay in telegraphing, and the telegraphing, as a rule, pays more rent than the same amount in money. The items of railroad transportation, telegraph, and rent messages, amount in the aggregate to nearly $700,000, or 90 per cent. of the whole free business.

THE TARIFFS.

During the past year two important modifications have been made in the tariffs. The first change was the abrogation of all Western Union rates bove $2.50, which took effect Feb. 1. The second important change was the extension of the square rate over the territory west of Omaha and east of Utah, and the equalization of the rates in the Eastern, Central and Southern States, which took effect July 1, 1873. The rates previous to July, 1873, were about 23 per cent. higher in the Western, and 40 per cent. higher in the Southern than in the Eastern States. This inequality was the subject of complaint in the Western and Southern States, and formed one of the strongest arguments in favor of the extension of competing lines and of governmental interference. Another serious objection to these unequal rates was that the special rates between competing points were so low in comparison that messages for distant points in the West or South could be sent to certain central points over our lines at special rates, and then be forwarded at local rates to their destination, at a considerable reduction from the through rate. For example: The square rate to offices in the vicinity of Chicago was $2. The special rate between New York and Chicago was $1, and, as the local rate from Chicago was only 40 cents, our customers or the opposition lines could send messages for such points to Chicago, and deliver them by our own lines, at a reduction of 50 to 60 cents from our through rates. This condition of things existed throughout the South and West, and to some extent in the East, and could only be remedied by an equalization of the rates, such as has been recently inaugurated.

EARNINGS IN SEVEN YEARS.

The following statement shows the net earnings of the Company since the consolidation, in 1866, and the disposition which has been made thereof:

The surplus of Income Account, July 1, 1866, was	$275,357 24
The net profits for seven years, from July 1, 1866, to June 30, 1873, have been	20,312,618 81
Making an aggregate, June 30, 1873, of	$20,587,976 05
Of this sum there has been	
Distributed in dividends to stockholders	4,857,239 34
Disbursed for interest on the Company's bonds	2,216,194 98
The balance	$13,514,541 73
is represented as follows:	
Construction of new lines and the erection of additional wires	$4,405,180 44
Purchase of telegraph lines and of the stock of companies controlled by the Western Union Company, on which or dividends are paid as rental	695,428 95
Western Union stock (72,952 shares)	4,054,483 07
Gold and Stock Telegraph Company's stock (47,710 shares)	1,173,509 00
International Ocean Telegraph Company's stock (10,384 shares)	961,556 42
Pacific and Atlantic Telegraph Company's stock (49,917 shares)	510,274 50
Anglo-American Telegraph Company's stock (£1,308 0s. 0d.)	10,000 00
Western Electric Mfg. Co.'s stock (500 shares)	39,000 00
Western Union Bonds redeemed and canceled	974,075 00
Western Union Broadway and Dey street Mortgage Sinking Fund	30,000 00
Real estate (exclusive of Broadway and Dey street property)	318,263 14
Patent—The Page and Duplex Telegraph	73,758 00
Cable steamer	12,665 19
Western Union Bonds not canceled ($7,500)	6,750 00
Fraction of share (old issue) redeemed and canceled	42 50
Total	$13,264,986 21
Leaving an excess of	$249,555 52

which excess is applicable on account of Sinking Fund appropriations not yet used for redemption of bonds.

All the above items are entered at the actual cost to the Company, in cash, except the $1,173,509 in stock of the Gold and Stock Telegraph Company, which is stated at par, and we should not be willing to sell it at that rate. Many of the other items are worth much more than cost.

THE INTERNATIONAL OCEAN TELEGRAPH COMPANY.

During the past year the Western Union Company have acquired control of the International Ocean Telegraph Company, whose lines extend from Lake City, Fla., to Havana, Cuba. The capital stock of this Company is $1,500,000, of which $850,000 is in common, and $650,000 preferred, stock. The Western Union Company purchased of the common stock $538,500, and of the preferred stock $499,900, making a total of $1,038,400 at the par value. The actual cost to us was $961,556.42. The International Ocean Company possess a fifty years' exclusive grant from the Spanish Government to lay and operate cables between Cuba and the United States, and a fifteen years' exclusive grant from the Government of the United States to lay and operate cables between the coast of Florida and the West India Islands. When the controlling interest in the stock of this Company was purchased, communication by cable between Florida and Havana was interrupted. In April last one of the cables between Key West and Havana was repaired, and a new one also laid down, and both are now in good working order. The lines of the International Ocean Company are now doing a good and profitable business with Cuba, Porto Rico and Jamaica, and when the cables connecting Jamaica with the other West India Islands, and to Central and South America, are completed, which, it is confidently expected, will be in a short time, the traffic upon these lines, which constitute the only outlet for the telegraphic correspondence of these countries with the United States and Europe, will become very large and important. The net profit of the International Ocean Company is now at the rate of about $200,000 per annum.

PACIFIC AND ATLANTIC.

We have also acquired during the last year a majority of the stock of the Pacific and Atlantic Telegraph Company, and negotiations have been in progress for some time with a view to leasing their lines. The capital of that Company is $2,000,000, Their lines extend from New York via Philadelphia and Baltimore to Pittsburg, Columbus, Indianapolis, St. Louis and St. Paul, branching at Dubuque to Chicago, and from Chicago to Cincinnati, Louisville, Nashville, Memphis and New Orleans. They own about 5,000 miles of line and 10,000 miles of wire, and the gross receipts last year were about $500,000. It is believed that an arrangement will be made, satisfactory to the holders of the balance of the stock, by which the lines will be turned over to the Western Union Company at an early day.

PNEUMATIC TUBES AND SUBTERRANEAN LINES.

In February last the Executive Committee authorized me to send Mr. George B. Prescott, the Electrician of the Company, and Gen. Thomas T. Eckert, the General Superintendent of the Eastern Division, to Europe, for the purpose of making a careful inspection of the system of pneumatic tubes and subterranean telegraph lines now in operation in the principal cities, and also to examine the working of the telegraph lines generally. They found the most complete system of pneumatic tubes and subterrean lines in operation in London, although both systems were extensively employed in Paris, Berlin, and other cities. In London about 13 miles of pneumatic tubing have been laid down, at a cost of £16,000, and about 10,000 messages per day are sent through them. The average time occupied in the transmission of messages through the pneumatic tubes is about two minutes, and the number of messages transmitted in each carrier is from eight to twenty, according to the size of the tubes. There are thirteen stations in the City of London connected by pneumatic tubes; and it is the opinion of Mr. Scudamore, the Manager of the English telegraphs, that it would be impossible to properly transmit the

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large number of messages between these offices in any other way than by pneumatic tubes. The system of underground lines in England embraces 3,000 miles of wires and nearly 100 miles of iron piping. There are, upon an average, 60 wires in each pipe, and the average cost per mile of wire is £23. While the first cost of underground lines is considerably greater than for those on poles, the interruption in the working of them and the cost of maintenance are claimed to be less, and the system is favorably regarded for the large cities. Messrs. Prescott and Eckert obtained minute and accurate information as to the best methods of constructing pneumatic tubes and underground lines, as well as much other valuable information in relation to the working of the telegraphs generally, which will be found of great importance in the future operation of our lines.

When our new building on the corner of Dey street and Broadway is completed, it is proposed to connect it by pneumatic tubes with the Stock and Produce Exchanges, and other important branch offices in the city. It is also contemplated to lay down subterranean lines in the lower part of the city, with the view of testing their efficiency and economy as compared with the present mode of construction.

STEARNS' DUPLEX TELEGRAPH.

The purchase of the patents for the United States and Canada of this most important and valuable of all the improvements which have been made since the Morse telegraph was first established, was mentioned in my last Annual Report. During the past year we have largely increased the number of Duplex instruments and apparatus, by means of which messages can be transmitted in opposite directions upon a single wire at the same time. We have now in operation over 100 sets, and it is the intention to have all our principal stations completely equipped with them as soon as they can be supplied from the factory. We are now operating more than 150,000 miles of wire, and during the past two years have been extending at the rate of nearly 20,000 miles of wire per annum. The Duplex apparatus is capable of doubling the capacity of these wires at a comparatively small cost. The value of this increase of facilities can be approximately ascertained by estimating the saving in the investment for wire and the annual saving in repairs and maintenance of additional wires. But the great value of the Duplex does not consist in the saving in the investment in wires and the cost of repairs and maintenance, but in its ability to double the capacity of a wire when we have but one, and when no amount of money previously invested in wires, or even possible to be expended in repairs, can provide another. Sometimes a storm or conflagration causes the interruption of all the wires on an important route at a time when every wire is needed to keep business moving. Communication is restored upon one wire at a time, and it is then that the great value of the Duplex becomes apparent. With it the moment one wire is restored we have two, and when we have a second we have four, and so on.

During the extraordinary excitement of the past three weeks our wires between the principal cities have been taxed to their utmost capacity, and if we had double the number on some routes they would have been insufficient. Every set of Duplex has been brought into requisition, and only our inability to procure them has prevented the use of a larger number. A minor consideration, and yet important one, is the fact that the Duplex can be substituted for, and its use does not involve the duplication of, the ordinary apparatus. It works equally well double or single. As our operators acquire experience in its use, the difficulties which attended it at first wholly disappear. They now adjust with such facility that the change from single to double is made in less than a minute, and I confidently expect that, by the time the necessary instruments can be manufactured, they will be largely introduced on railroad and other way wires.

GOLD AND STOCK TELEGRAPH COMPANY.

The Western Union Company own 47,710 shares, of the par value of $25 per share, of the stock of the Gold and Stock Telegraph Company, out of the capital of 100,000 shares. The Gold and Stock Telegraph Company transmits its reports over the Western Union lines, and during the past year paid us in tolls $77,995, and one dividend of 3 per cent. amounting to $35,970. Within the last two years the Gold and Stock Telegraph Company have added to their property, in instruments, poles, wires, fixtures, &c., about $400,000. The gross receipts of that Company in 1871 were $236,215; in 1872, $534,780, and in 1873, $623,900. They had earning revenue:

In 1869... 572 instruments	In 1872....1,594 instruments.
In 1870 ... 741 instruments.	In 1873....1,783 instruments.
In 1871.... 830 instruments.	

The Private Line department in the City of New York has a rental of $49,290 per annum, and is steadily increasing. The net income of the Company from private lines in other cities is equal to that of this city, and is also increasing steadily.

In order to be prepared for the large increase of business, the expenditure for construction has been very large, and has interfered with the payment of regular dividends, but the Company is now becoming well supplied with lines and equipments, and it is confidently anticipated that regular dividends will be paid hereafter.

THE COMPANY'S FACTORY.

In January last the factory in New Church street was completed at a cost of $139,772, of which $85,000 was paid for the land and building. The lot is 104 feet on New Church street, by an average depth of 36 feet. The building is admirably adapted to the manufacture of telegraph apparatus, and is in close proximity to the permanent headquarters of the Company in their new building. The factory is now capable of supplying all the apparatus required by the Company, and its capacity can be more than doubled when required. The operations of the factory for the past six months show a small profit after deducting the interest on the investment. The apparatus made at this factory greatly excels any other manufactured in this country, and it is the superior quality of the material and workmanship, rather than the saving in the cost of the instruments, which constituted the great inducement for establishing it.

THE NEW BUILDING.

The avails of the $1,500,000 of bonds issued on the mortgage of the real estate at the corner of Broadway and Dey street amounted to		$1,497,883 69
Accrued interest received		15,106 34
Interest on avails unexpended July 1, 1873		30,075 00
Received for sale of old material		1,000 00
Total received up to July 1, 1873		$1,544,065 03
Expenditures for purchase of the real estate at the corner of Broadway and Dey street up to July 1, 1873		855,000 00
Interest on bonds	$121,012 50	
Taxes, &c., &c	10,869 56	
Interest on Dodge contract	3,320 76	
Commission on sale and expense of preparing bonds	14,720 84	
Amount paid to architect and builders	220,048 04	369,981 70
Total expended to July 1, 1873		$1,224,981 70

The work on the building has not progressed as rapidly as was expected, and it will be impossible to occupy it, as originally contemplated, in the Spring of 1874. The delay has been occasioned wholly by the inability to procure the granite within the time required. Some changes have been made in the original plan, by which the cost will be somewhat increased. All the work is being done in the most thorough and substantial manner, and the building promises to be, when completed, one of the finest in the city. The total cost for land and building, furnished and equipped with the machinery and apparatus required by the Company, will be about $1,700,000. The basement and cellar will be occupied by the Company. The first, second, and at least one other story, will be offered for rent. It is not expected that the annual cost to the Company in excess of the income from rents will be much, if any, greater in the new building than has been paid for the premises now occupied, while we shall have double the space, and superior accommodations in every particular.

At the date of the consolidation with the American Telegraph Company, July 1, 1866, the capital of the Western Union Company issued and liable to be issued was, as it now is, $41,073,410. The Company was then in possession of about 75,000 miles of wire, on which were transmitted during the year following about 5,800,000 messages. At that time all the lines on the Pacific Coast, and nearly all in the States of Iowa, Illinois, and in Northern Missouri, although working in connection with ours, were owned and controlled by other companies. Although the Western Union Company owned a line between the Missouri River and Salt Lake City, at which point connection was had with the California and Pacific Coast lines, its business from Chicago to the Missouri River was obliged to pass over the lines of another company. Since that time we have acquired, by lease and purchase, the lines of the Illinois and Mississippi Company which occupied the States of Illinois and Iowa; of the Chicago and Mississippi Company, which occupied Northern Missouri; and of the California State Company, which occupied the territory on the Pacific Coast and west of Salt Lake City.

On the 1st of July, 1873, the Western Union Company controlled and operated more than 150,000 miles of wire, and owned the controlling interest in companies operating over 10,000 miles more.

During this period of seven years, in which the Company's lines and wires have been doubled in extent, and the capital stock outstanding has been reduced by more than $7,000,000, and other property acquired representing in the aggregate more than $13,000,000, the volume of business has increased from less than 6,000,000 messages in 1866 to about 14,500,000 in 1873. The gross receipts during the same period have grown from $6,500,000 to $9,333,000, but the profits have not increased either in proportion to the volume of business or to the gross receipts, the excess of 1873 over 1866-7 being but about $130,000. A brief statement of the causes which have produced this result seems proper at this time. They are mainly these:

1. The enhanced cost of labor, of poles, wire, and all material used in constructing, maintaining and operating the lines.

2. The reduction of rates rendered necessary by the action of competing companies between stations on the route of their lines, in the first instance; and later reduction in other sections in order to equalize rates, and thereby remove the inducement for competing lines to extend still further.

No public business of equal importance is so sensitive to competition as that of the telegraph, and with no other can competition be inaugurated by the

outlay relatively of so small an amount of capital. Two classes of persons are always interested in promoting telegraphic competition—first, those who organize the companies, and hope to profit by contracts for construction of the lines, or by stock bonuses and commissions on the sales of stock ; and, second, the senders of messages, who are willing to risk the income from a moderate investment if thereby a larger sum can be saved annually from the reduction of telegraph tolls which a competing line is expected to secure.

In 1866, the only telegraph lines in the country competing with the Western Union were those of two companies—one extending from Boston to Washington, and the other from New York to Washington. The latter, let me remark, after sinking its capital of about $750,000, was sold for debts contracted, amounting to $120,000 more, and afterward leased by the purchaser to the Western Union for six per cent. per annum on that sum. But in 1867 and 1868 several new companies were organized, and the work of constructing competing lines was pushed with much earnestness during the next three years. Parties willing to subscribe liberally to the capital stock of these companies were readily found, some influenced by the promise of ten per cent. annual dividends on the par of shares for which they were asked to pay but forty per cent., and that in quarterly instalments, and others by the argument that, at the reduced rates promised, a handsome profit would result from the saving on their own messages, even if no dividends were paid on the capital. The effect of this competition upon the Western Union Company's business may be readily seen by an inspection of the results of 1870, as compared with 1869. For the latter year the gross receipts were about $7,300,000, and the net profits $2,750,000, while for 1870, although the gross receipts were nearly the same, the profits were less than the previous year by more than $500,000, and it was not until 1872 that our profits exceeded those of 1869, and then by only $40,000.

At the same time that competition has been operating to reduce the rates and increase the expenses, we have been called upon at every session of Congress, for the last four years, to defend the policy and management of the Company from charges made by members of both Houses of Congress, by officials of the Government, and in a few instances by the press. The effect of these hostile proceedings against the Company has been to induce the Executive Committee to proceed more rapidly with the work of increasing the facilities and reducing the rates than the actual condition of the Company's affairs may, at first sight, seem to justify. But little reflection will, however, be necessary in order to satisfy you of the wisdom of their action.

The scale of rates fixed by competition on the most important routes, and between the principal cities, has been applied recently to the whole country east of the Rocky Mountains, so that the inducement to subscribe capital for the extension of competing lines, in order to secure the benefit of competing rates, no longer exists. At the rates now established it is impossible for any competing company to realize profits, and some of them are known to be, and all are believed to be, operating at a loss. As a result, the extension of competing lines has ceased, and it is not believed that capital can be found wherewith to inaugurate new enterprises in any quarter. The time is not distant, therefore, when the Western Union Company will be without a substantial competitor in the conduct of a business which, notwithstanding the enormous growth of the last seven years, is still in its infancy. With the increase of wires, already provided and now in progress, the capacity of which the Duplex Apparatus, hereinbefore spoken of, will be able to double at small cost, it is believed that the constantly increasing volume of business, the growth of which will be stimulated by the present low and uniform rates, can be successfully handled with a less annual investment in new construction than has heretofore been necessary ; so that, with competition checked and in process of being extinguished, the percentage of expenses may be reduced, and the patience of the stockholders be rewarded at an early day by the resumption of regular dividends.

Respectfully submitted,
WILLIAM ORTON, *President.*

At the annual meeting of the stockholders of the Western Union Telegraph Company, held at the office of the Company, 145 Broadway, New York, October 8th, 1873, the following persons were elected Directors and Inspectors of Election for the ensuing year :

Directors.

WILLIAM ORTON,	JAMES H. BANKER,
ALONZO B. CORNELL,	HARRISON DURKEE,
NORVIN GREEN,	JOSEPH HARKER,
EDWIN D. MORGAN.	AUGUSTUS SCHELL,
W. K. THORNE,	C. VANDERBILT,
FRANK WORK,	CHESTER W. CHAPIN,
EZRA CORNELL,	CYRUS W. FIELD,
WILSON G. HUNT,	DAVID JONES,
C. LIVINGSTON,	GEORGE H. MUMFORD,
O. H. PALMER,	GEORGE M. PULLMAN,
E. S. SANFORD,	HIRAM SIBLEY,
JOHN STEWARD,	MOSES TAYLOR,
W. H. VANDERBILT,	W. R. VERMILYE,
E. B. WESLEY,	STILLMAN WITT,

E. D. WORCESTER.

Inspectors of Election.

GEO. B. PRESCOTT, LEONARD COX,
WM. ARNOUX.

WESTERN UNION TELEGRAPH COMPANY,
OFFICE OF THE GENL. SUPT. OF THE PACIFIC DIVISION,
SAN FRANCISCO, Oct. 1st, 1873.

To the Editor Journal of the Telegraph :

DEAR SIR : The following appointments, resignations and transfers have taken place since last report :

APPOINTMENTS.

F. W. A. Crain, Eugene City, Oregon.
A. L. Smith, Hollister, Cal.
C. D. Ellis, Stockton, Cal.
L. T. Cummings, Peters, Cal.
A. D. Ayres, Mineral Hill, Nevada.
M. Bounds, Woodlawn, Cal.
M. Soper, San Bernardino, Cal.
H. S. Stevens, Oregon City, Oregon.
W. McRavey, Winnemucca, Nevada.
Chas. Lagrave, Unionville, Nevada.

TRANSFERS.

G. R. Stanton, Stockton, Cal., to Reno, Nevada.
David Crawford, San Francisco, Cal., to Reno, Nevada.
G. A. Taylor, Oregon City, Oregon, to Oakland, Oregon.

RESIGNATIONS.

A. V. Peters, Eugene City, Oregon.
J. T. Prentice, Peters, Cal.
W. A. Langborne, Mineral Hill, Nevada.
C. W. Gearhart, Woodland, Cal.
T. F. Donelin, Winnemucca, Nevada.
Miss Banks, Unionville, Nevada.

Yours truly,
JAS. GAMBLE, *Genl. Supt.*

MATHEMATICS FOR NON-MATHEMATICIANS.

By WILLIAM PAGET HIGGS, LL.D., D. Sc.

DIVISION I.—THE ALGEBRA OF CONSTANT QUANTITIES.

Common Uses of Common Logarithms.

There are, of course, many important applications of logarithms that could not be included here. Some of these applications require a technical knowledge of the science to which they are applied ; others again call for a knowledge of the higher mathematics to which we have not yet attained. But perhaps the property of logarithms most interesting to the general reader is that relating to compound interest. On this point no one is so clear as the late Professor De Morgan ; and, not to make a vain attempt to embody his meaning in words as concise, it will be better to quote in full what he says. The quotation is from the "Essay on Probabilities,* p. 13.

The principle upon which mathematical abbreviation frequently proceeds is this : that where the calculation of a few results materially aids the production of a great many more, it is advisable to calculate a multitude of results, to arrange them in convenient tables of reference, and to publish them ; so that by means of one person taking a little more trouble than would otherwise fall to his share, all others may be saved labor altogether. Mathematical tables are frequently nothing but the result of labor performed once for all; but it also sometimes happens that the principle on which the labor is performed can be exemplified by a familiar case of it. We shall take that of logarithms as an instance.

Every table of logarithms is an extensive table of compound interest.—Not to embarrass ourselves with fractions, let us take a table of *cent* per *cent* compound interest. We have then the following amounts of £1 in 1, 2, 3, &c., years :

Years.	*Amount.*	*Years.*	*Amount.*
0	£1	14	£16,384
1	2	15	32,768
2	4	16	65,536
3	8	17	131,072
4	16	18	262,144
5	32	19	524,288
6	64	20	1,048,576
7	128	21	2,097,152
8	256	22	4,194,304
9	512	23	8,388,608
10	1,024	24	16,777,216
11	2,048	25	33,554,432
12	4,096	26	67,108,804
13	8,192	27	134,217,728

The property of this table is, that if we wish to multiply together any two numbers called amounts, we have only to add together the number of years they belong to, and look opposite the sum in the table of years. Thus, 11 and 12 *added* together give 23 ; 2,048 and 4,096 *multiplied* together give 8,388,608. The reason is as follows : If £1 in 11 years yield £2,048, and if this £2,048 be put out for 12 years more, then, since £1 in 12 years yields £4,096, 2,048 times as much will yield £2,048 × 4,096 ; or the amount in 11 + 12 years is the product of the amounts in 11 and 12 years. The only reason why the preceding table is not in the common sense of the word a table of logarithms, is, that its construction leaves

* "An Essay on Probabilities, and on their Application to Life Contingencies and Insurance Offices." By Augustus De Morgan, Professor of Mathematics in University College, London. Longmans & Co.

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out most of the numbers. We can deal with 2,048 and 4,096, but there is nothing between them. The remedy is to construct a table of compound interest, at such an excessively small interest, that a year shall never add so much as a pound throughout. Certain considerations, by which the table may be shortened, but with which we have here nothing to do, make it convenient to suppose such a rate of interest, that £1 shall increase to £10 in not less than 100,000 years, at compound interest. Or we may suppose interest payable 100,000 times a year, and say, let the whole *yearly* interest be 1,000 per cent. per annum. Taking the first supposition, we have a part of a table of logarithms as follows:

Amount.	*Years.*	*Amount.*	*Years.*
1000	300,043	5232	371,867
1001	300,087	5233	371,875
1002	300,130	5234	371,833
1063	300,173	5235	371,892
&c.,	&c.,	&c.,	&c.

This is the light in which a common reader may view a table of logarithms. Let 1 increase to 10 at compound interest in 100,000 equal moments, then 1 will become 5,234 in 371,883 such moments; and so on. We can thus manage to put down every number, within certain limits, as an amount; and thus, within those limits, we reduce all questions of multiplication and division to addition and subtraction by reference to the tables. We thus perceive a simple principle applied with much labor, but such as is performed once for all. The notion above elucidated was the first on which logarithms were constructed; in time came more easy methods.

Professor De Morgan then recurs to another method of abbreviation, and we may, for the method will presently be very useful, continue the quotation. The abbreviation is applied to the multiplication of all the successive numbers from 1 up to some higher number.

Let [10], for instance, represent the product of all the numbers, from 1 up to 10, both inclusive, or let [10] stand for—

$$1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 = 3{,}628{,}800.$$

[1] is 1; [2] is 2; [3] is 6; [4] is 24; [5] is 120; [6] is 720; [7] is 5,040; [8] 40,320; and so on. This labor becomes absolutely unbearable when the numbers become larger; thus [30] (or the numbers up to 30 multiplied together) contains 33 places of figures, and [1,000] contains 2,568 figures. But, nevertheless, we cannot deal with problems in which there are 1,000 possible cases without knowing, *either nearly or exactly*, the value of [1,000]. It will, however, be sufficient to know this value nearly; within, say, a thousandth part of the whole; that is, as nearly as when, the answer of a problem being 1,000, we find something between 999 and 1,001. We now put before the reader who can use logarithms a rule for this approximation, with an example; intending thereby to show the reader who does not comprehend the process, how mathematics enter into the abbreviation of tedious computations.

Rule.—To find very nearly the value of [a given number], from the logarithm of that number, subtract 0·4342945,* and multiply the difference by the given number, for a first step. Again, to the logarithm of the given number, add 0.7981799, and take half the sum, for a second step. Add together the results of the first and second steps, and the sum is nearly the logarithm of the product of all numbers up to the given number inclusive. For still greater exactness, add to the final result its aliquot part, whose divisor is 12 times the given number.

Example.—What is—

[30] or $1 \times 2 \times 3 \times \ldots\ldots \times 29 \times 30$?

First Step.

log. 30 = 1·4771213
0·4342945
1·0428268
30
31·284804 Result.

Second Step.

log. 30 = 1·4771213
0·7981799
2)2·2753012
1·1376506 Result.

The sum of the results is—

32·422455

which is the log. of result of problem.

The result has, therefore, 33 places of figures, of which the first six are (nearly) 264,518; or, if this be increased by its 360th (12 times 30) part, or about 735, the result is 265,253, followed by 27 ciphers, and the error is not so much of the whole as one part out of 500,000. In this way, we are able to do with more than sufficient nearness, and in a few minutes, what it would take days to arrive at by the common method and with much greater risk of error.

If we wish to find the product of all the numbers, say, from 31 to 100, both inclusive, we find [100] and [30] approximately, and divide the first by the second.

This selection from a work that should be better known to the reader of mathematical tendency will serve to illustrate the application of logarithms to extremely lengthy calculations. Another application now to be considered is to the immediate computation of amounts at compound interest, a class of calculation in which logarithms are of high value.

Before the subject can come within easy grasp, there will be necessary some explanation of other terms than those already made known. An amount at compound interest increases in what is named geometrical progression.

Arithmetical and Geometrical Progression.

An amount (a) is ordinarily understood to be capable of increase by one of two methods:

(1). It may increase by a constant difference d, as—

$$a,\ a+d,\ a+d+d,\ a+d+d+d,\ \&c.,$$

or—

$$a,\ a+d,\ a+2d,\ a+3d,\ \&c.,$$

when the progression is said to be *arithmetical*. For example—

1, 2, 3, &c.,

is an arithmetical progression, the difference, d, being 1. This progression might be written:

1, 1+1, 1+1+1, &c.

It will be seen that the last term (l) can be obtained from the formula—

$$l = a + (n-1)d,$$

where n is the number of terms, a the first term, and d the common difference. Thus—to give a self-evident example—the last term of the arithmetical series,

1, 2, 3, 4, 5,

is—

$$1 + (5-1)1 = 5.$$

(2). Or an amount may increase by multiplication by a constant quantity. An amount is then said to increase in *geometrical* progression, as

2, 4, 8, 16, 32, &c.

While, in any *arithmetical* series or progression, a number or term subtracted from the next following number or term, yields a constant *difference;* in a *geometrical* series, a term divided into the next term gives a constant *quotient* or *ratio.* The common ratio of the series just given is 2. The general algebraic formula for the geometrical series is—

$$a,\ a\,r,\ (a\,r)r,\ (a\,r\,r)r,\ \&c.,$$

or—

$$a,\ a\,r,\ a\,r^2,\ a\,r^3,\ \&c.,$$

a being the first term, and r the common ratio or constant multiplier. Study of the series will show us that the last term (l) will be equal to

$$l = a\,r^{n-1}.$$

The last term in the given series is thus—

$$l = 2(2^{5-1}) = 2(2^4) = 2 \times 16 = 32.$$

An amount increasing at compound interest or in geometrical progression, is thus put before us in a new light. For, if it be required to know—what will be the amount of a given sum placed at compound interest for so many years, at such a rate per cent.—we can put the question under the form—what is the last term (the amount) of a geometrical series, to be obtained from a knowledge of the first term (the sum placed out), the number of terms (years), and the common ratio (rate per cent).

Example.—Required the amount, at compound interest, of £2,273, in 3 years, at 5 per cent?

Here 2,273 is the first term; 3 the number of terms; and 1·05 (the amount of £1 for 1 year) the common ratio. Now, the formula $l = a\,r^{n-1}$ directs us to raise r, the common ratio, to the n' power, and to multiply the result by the first term. The log. of $r = 1{\cdot}05$ is 0·0211893, and this multiplied by n or 3 (see Rule III. for logarithms) is = 0·0635679.

log. (1.05 × = 0·0635679
log. 2 ,3 = 3·3565994
3·4201673 log. 2631.2.

Answer £2,631 10s.

Had we from the amount of £2,631 10s. sought the principal, the interest being given, the following process—the reverse of the preceding—would have been adopted:

$2631{\cdot}2 \div 1{\cdot}05^3$ = principal, or—

$$\frac{l}{r^n} = a.$$

log. 2631·2 = 34201673
log. $1{\cdot}05^3$ = 0·0635679
3·3565994 = log 2273.

Had the rate of interest been demanded, the method employed would obviously have been that indicated by the expression—

$1{\cdot}05^1 = 2631{\cdot}2 \div 2273$, since

$$r^n = \frac{l}{a}.$$

$2273 \times 1{\cdot}05^3 = 261{\cdot}2$; or
log. 2631·2 = 3·4201673
log. 2273 = 3·3565994
3)0·0635670
0·0211893 = log. 1·05.

1·05 is an increment to 1 of 0·05, or 5 in the hundred (per centum).

Had the time been required, we find—

log. $1{\cdot}05^3$ ÷ log. 1·05 = 3, the number of years; or—

$$\frac{r^n}{r} = n.$$

A very neat application of the laws of compound interest to electrical science will be found in the appendix to Mr. Culley's "Handbook of the Telegraph," in the determination of the state of insulation of a cable by fall of charge.

* These numbers are obtained by calculation, which need not be given here.

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TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKNOWLEDGMENT OF RECEIPTS FOR ASSESSMENTS NOS. 47 AND 48, UP TO OCTOBER 11.

4, 8, 13, 15, 17, 21, 22, 23, 26, 27, 29, 31, 33, 39, 46, 55, 59, 61, 67, 70, 72, 75, 76, 77, 80, 82, 89, 90, 95, 97, 99, 100, 101, 107, 108, 111, 114, 120, 121, 122, 129, 131, 133, 134, 141, 142, 144, 146, 153, 166, 169, 179, 181, 183, 189, 190, 191, 193, 197, 198, 200, 201, 213, 218, 220, 227, 230, 231, 232, 237, 238, 242, 244, 245, 246, 247, 248, 254, 255, 257, 258, 267, 271, 273, 276, 278, 279, 280, 281, 282, 283, 285, 286, 288, 303, 319, 323, 342, 350, 353, 354, 357, 359, 360, 361, 362, 364, 366, 367, 372, 378, 379, 382, 385, 391, 392, 393, 394, 398, 402, 406, 411, 412, 416, 418, 430, 431, 438, 441, 451, 453, 455, 456, 457, 463, 476, 481, 482, 484, 511, 512, 516, 520, 527, 532, 533, 536, 546, 548, 553, 555, 556, 557, 562, 566, 569, 574, 575, 576, 577, 579, 584, 586, 587, 590, 592, 594, 597, 602, 603, 615, 517, 618, 622, 626, 627, 628, 630, 632, 642, 648, 649, 655, 656, 659, 660, 661, 662, 663, 664, 665, 667, 669, 670, 678, 679, 680, 684, 685, 694, 698, 701, 708, 710, 714, 717, 722, 725, 729, 730, 732, 733, 734, 735, 737, 738, 741, 750, 751, 756, 764, 772, 775, 781, 782, 783, 785, 786, 789, 798, 799, 802, 803, 804, 808, 809, 812, 813, 820, 825, 831, 836, 838, 841, 848, 855, 856, 869, 870, 871, 875, 883, 886, 899, 901, 905, 906, 908, 911, 912, 915, 920, 922, 926, 927, 930, 931, 938, 939, 841, 942, 943, 944, 949, 952, 976, 978, 980, 991, 992, 995, 998, 1000, 1001, 1002, 1005, 1011, 1014, 1016, 1023, 1026, 1030, 1031, 1032, 1033, 1034, 1040, 1044, 1047, 1050, 1054, 1055, 1058, 1063, 1073, 1074, 1075, 1076, 1080, 1084, 1093, 1098, 1100, 1101, 1102, 1109, 1127, 1141, 1144, 1147, 1149, 1152, 1153, 1155, 1156, 1257, 1159, 1160, 1162, 1164, 1167, 1175, 1185, 1190, 1191, 1195, 1196, 1199, 1200, 1201, 1205, 1210, 1213, 1217, 1222, 1224, 1225, 1226, 1227, 1231, 1237, 1238, 1239, 1240, 1241, 1255, 2256, 1263, 1266, 1267, 1270, 1273, 1274, 1275, 1276, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1290, 1292, 1294, 1303, 1307, 1308, 1309, 1311, 1312, 1313, 1314, 1315, 1317, 1318, 1319, 1320, 1321, 1322, 1325, 1327, 1333, 1339, 1340, 1342, 1343, 1344, 1345, 1346, 1348, 1349, 1350, 1351, 1352, 1353, 1354, 1355, 1358, 1359, 1360, 1363, 1364, 1365, 1366, 1371, 1372, 1375, 1376, 1383, 1385, 1387, 1389, 1390, 1391, 1393, 1394, 1402, 1403, 1404, 1405, 1406, 1407, 1410, 1412, 1415, 1417, 1418, 1419, 1421, 1425, 1426, 1427, 1428, 1430, 1431, 1432, 1433, 1440, 1444, 1448, 1450, 1451, 1453, 1454, 1455, 1456, 1457, 1458, 1459, 1461, 1462, 1464, 1465, 1469, 1470, 1471, 1474, 1475, 1476, 1479, 1481, 1482, 1483, 1484, 1485, 1487, 1488, 1490, 1497, 1498, 1503, 1505, 1506, 1507, 1508, 1511, 1513, 1514, 1522, 1524, 1531, 1537, 1539, 1542, 1543, 1546, 1554, 1558, 1559, 1562, 1563, 1564, 1566, 1569, 1572, 1576, 1579, 1582, 1586, 1593, 1594, 1610, 1611, 1612, 1615, 1616, 1623, 1625, 1626, 1629, 1630, 1631, 1632, 1633, 1634, 1644, 1646, 1648, 1649, 1651, 1652, 1656, 1658, 1660, 1661, 1662, 1663, 1665, 1666, 1673, 1676, 1681, 1682, 1684, 1687, 1688, 1697, 1700, 1701, 1702, 1704, 1707, 1709, 1711, 1713, 1714, 1715, 1716, 1719, 1720, 1721, 1723, 1724, 1728, 1730, 1731, 1733, 1737, 1738, 1745, 1746, 2747, 1760, 1763, 1773, 1775, 1781, 1785, 1786, 1791, 1802, 1803, 1805, 1806, 1811, 1812, 1814, 1817, 1818, 1820, 1821, 1825, 1828, 1829, 1837, 1838, 1839, 1840, 1841, 1843, 1844, 1845, 1847, 1852, 1857, 1858, 1859, 1863, 1864, 1867, 1868, 1872, 1874, 1876, 1877, 1879, 1880, 1882, 1883, 1888, 1889, 1900, 1901, 1903, 1907, 1911, 1912, 1913, 1914, 1915, 1917, 1918, 1931, 1938, 1939, 1941, 1942, 1943, 1944, 1951, 1953, 1954, 1958, 1959, 1962, 1963, 1964, 1965, 1966, 1970, 1972, 1973, 1974, 1975, 1976, 1985, 1986, 1988, 1989, 1991, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2004, 2006, 2007, 2008, 2009, 2010, 2012, 2013, 2017, 2022, 2023, 2024, 2030, 2033, 2039, 2040, 2041, 2042, 2045, 2048, 2050, 2051, 2052, 2053, 2054, 2056, 2057, 2058, 2059, 2060, 2061, 2068, 2072, 2074, 2075, 2077, 2078, 2079, 2081, 2082, 2084, 2085, 2087, 2088, 2089, 2090, 2091, 2092.

ASSESSMENTS NOS. 44, 45 AND 46.

84, 171, 206, 252, 261, 273, 294, 316, 347, 447, 712, 732, 766, 790, 801, 851, 904, 1057, 1105, 1106, 1107, 1102, 1109, 1110, 1112, 1113, 1115, 1117, 1119, 1120, 1121, 1122, 1123, 1125, 1127, 1130, 1131, 1134, 1135, 1136, 1388, 1432, 1528, 1529, 1530, 1597, 1620, 1622, 1718, 1722, 1750, 1751, 1752, 1753, 1754, 1755, 1756, 1757, 1758, 1759, 1760, 1761, 1768, 1769, 1771, 1772, 1778, 1779, 1780, 1784, 1825, 1895, 1896, 1897, 1917, 1930, 1973, 2025, 2039, 2063, 2064, 2066.

NOS. 44 AND 45.—1770, 1968.

No. 44.—1069, 1187.

The following statement shows the return to the triple assessment of July 15th:

No. 44, for benefit of heirs of Thos. Wilcox, of Chicago, $1,238.
No. 45, " " Edwd. Wade, of Nashville, 1,226.
No. 46, " " R. S. Fowler, of Dubuque, 1,240.

For the first time in our history we will be compelled to issue a quadruple assessment. Four old members have paid their last dollar, and passed away. As they were faithful to their obligations to others, through the four years of their membership, let us, likewise, be true to their memory, and bear, with willing hearts, the burden the death of so many at once entails upon us.

John A. Conley, holder of certificate No. 562, died at Little Rock, Ark., on Sept. 20, of congestion.

M. H. Bacon, certificate No. 459, died Sept. 30th, at Painesville, Ohio, of consumption.

Edwin S. Keep, certificate No. 359, died Oct. 1st, at Albany, N. Y., of consumption.

Alfred Saville, certificate No. 354, died Oct. 7th, of yellow fever, at Shreveport, Miss. The death of the latter was attended with peculiar circumstances, the particulars of which appear in another part of this paper.

Members are again reminded of the seventh annual meeting of our association, which will be held at 145 Broadway, N Y., on Wednesday, Nov. 5th. New officers will be elected for the ensuing year, and other business of importance, reference to which was made in Journal of Sept. 15, will be brought before the meeting.

It is hoped that a large attendance will be secured at this meeting. Many things require thoughtful investigation, especially at this juncture. It seems a crisis in the history of the Association, and it can be met only by mutual counsels and an intelligent deliberation as to the course to be pursued. Let all come.

Alexander E. Hoyt has been appointed agent for the Association at Halifax, N. S. Members in that section will please remit through him as far as may be convenient.

THE Evangelical Alliance has been the cause of considerable care and anxiety in some of our telegraph offices. Owing to the peculiar and technical language in which the speakers occasionally indulged, and the fact that the reporters' copy was often badly written, the operators frequently hesitated and stumbled in transmitting the usual press report of the proceedings. Such words as Œcumenical, Nicene, Ultramontane, Trinitarian, though familiar to polemical ears, were so much Greek to the barbaric knights of the telegraph and the difficulty of reading the copy was greatly increased thereby.

But the difficulties resulting from this great gathering were not alone confined to the trouble of deciphering the reporters' hieroglyphics or professional technicalities. A gentleman out west sent a dispatch to a delegate addressed as follows: John Doe, Evangelical Alliance, N. Y. The message was duly transmitted and delivered, but in checking up the business at the station whence the message originated, the entry clerk searched in vain among tariff books for such an office as Evangelical Alliance, N. Y., and finally gave up in despair and sent a message of inquiry to the Manager of the New York office to ascertain who he should check on message to Evangelical Alliance, N. Y., there being no such office in his tariff-book, either on this or other lines.

CHICAGO MANUFACTURES.

We cannot, in the present number, give an extended account of the Electrical Department in the Chicago Inter-State Industrial Exposition, which opened September 25th. The formal opening was somewhat in advance of the full preparation of the articles for exhibition, but the arrangements are going rapidly forward.

Before the Exposition closes, which will be early in November, we expect to give a detailed account of the electrical apparatus on exhibition from the establishments of *Geo. H. Bliss & Co.* and the *Western Electric Manufacturing Company.*

The articles on exhibition will represent the progress and improvements that are taking place in electric and telegraph instruments.

We may add, in this connection, that the Western Electric Manufacturing Company has grown in its manufacturing department until it is now the largest telegraph instrument manufactory in the country, and is still growing.

The high quality of their workmanship has always made their instruments great favorites with their customers.

The inventive genius of their Mr. Gray has enabled them to place their various specialties in the front rank. But notwithstanding the success of their annunciators, printers, fire alarms, &c., the company finds its principal business in furnishing the standard Morse Telegraph Instruments for commercial and railroad lines.

AWARD OF PREMIUMS AT THE CINCINNATI EXPOSITION.

The following are the award of premiums to the electric and telegraph apparatus on exhibition at the Cincinnati Exposition:

Best system of fire alarm telegraph (in operation); gold medal. J. N. Gamewell & Co.

Fire alarm signal box; silver medal. J. N. Gamewell & Co.

Adaptation of the telegraph to domestic use; silver medal. American District Telegraph Company.

Burglar alarm; bronze medal. American District Telegraph Company.

Best system of telegraphic railway signals; silver medal. Electric Railroad Signal Company.

Best telegraphic instrument for stock quotations; silver medal. Gold and Stock Telegraph Company.

Set of instruments for electrical measurements; silver medal. L. Bradley.

Telegraphic battery, for force, durability and economy; silver medal. Lockwood Battery Company.

Combination of Morse telegraphic instruments; bronze medal. L. G. Tillotson and Company.

Pocket relay magnet; bronze medal. L. G. Tillotson and Company.

Morse register; bronze medal. L. G. Tillotson and Company.

Telegrahic sounder; bronze medal. L. G. Tillotson and Company.

Hotel annunciator, operated by electricity; bronze medal. E. T. Gilliland.

Magnetic watchman's clock; bronze medal. E. T. Gilliland.

Box relay with key attached; bronze medal. Telegraph Supply and Mfg. Company.

Dial telegraphic instrument; bronze medal. Cleveland Mfg. and Supply Company.

Lightning rod; bronze medal. T. F. Randolph.

Electric gas-lighting apparatus; bronze medal. Bachelder Torch Company.

It will be seen that New York carried off twelve of the premiums awarded. The Exposition, which was the greatest and most successful ever held in America, was brought to a close on Saturday, October 4th.

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JULY, 1873.

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F. Drake.....Saginaw City, Mich.
C. S. Helbourne.....Tawas City, Mich.
Miss P. Walker.....Cincinnati, O.
E. B. Powers..... "
F. B. Williams..... "
J. Kelley..... "
C. W. Chamberlain..... "
J. A. McKenna..... "
Miss B. Humphrey..... "
P. Howe.....Columbus, O.
W. Bernard.....Ironton, O.
B. J. Honaker.....Manchester, O.
T. J. Townes.....Portsmouth, O.
F. J. Johns.....Riverton, O.
W. A. Ford.....Cresson, Pa.
W. B. Case.....East Liberty, Pa.
W. B. Ogden.....Indiana, Pa.
W. J. Dingman.....Parker's Landing, Pa.
R. W. Purdam.....Summit City, Pa.
S. M. Bell.....West Alexander, Pa.
J. D. Thompson.....Wheeling, W. Va.
V. H. Muse.....Pittsburgh, Pa.
Z. Miller..... " "
H. Humphreyville.....Lima, O.
D. B. Rouss.....Newark, O.
J. A. Stamfield.....Boston, Va.
E. A. J. C. Hall.....G. W. Sulphur Springs, Va.
D. A. White.....Mebanesville, N. C.
R. Fulton.....Staunton, Va.
H. S. Rady.....Weldon, N. C.
T. B. Moxen.....Wilmington, N. C.
J. A. Bransford.....Jarretts, Va.
D. A. Traxen.....Timmonsville, S. C.
J. W. Kernodle.....Guntown, Miss.
C. D. Thompson.....Shelby Springs, Ala.
R. T. Bishop.....Montgomery, Ala.
R. Williams.....Mobile, Ala.
N. A. Chiles.....Quitman, Ga.
W. Readus.....Enterprise, Miss.
W. D. Biggs.....Madison, Ark.
E. Yates.....Argenta, Ark.
C. E. Morrow.....Monroe, La.
C. Newton.....Shreveport, La.
W. C. Nichols.....Chrystal Springs, Miss.
R. J. Haight.....Lafourche, La.
T. P. Moone.....McComb City, La.
F. G. Goodrich.....New Orleans, La.
J. B. Russell.....Columbus, Texas.
Jno. Kemp.....Brenham, Texas.
M. L. Love.....Mexia, Texas.
J. J. Galliven.....Calvert, Texas.
F. G. Gynn.....Houston, Texas.
J. E. Norris.....Van Elstyne, Texas.
N. D. Fagen.....Englewood, Texas.
J. T. Hull.....Wearne, Texas.
Leo. Mainhart.....Danville, Tenn.
J. H. Foster.....Hillsboro, Tenn.
P. F. G. Bennett.....Mason, Tenn.

J. M. Ferris.....Stanton, Tenn.
J. H. Bright.....Union City, Tenn.
E. Coleman.....Louisville, Ky.
H. J. Moss.....Allentown, Pa.
J. E. Zueblin.....Atlantic City, N. J.
B. Plummer.....Ashbury Park, N. J.
L. D. Wilbourne.....Baltimore, Md.
J. C. Davidson.....Bedford, Pa.
Allen Pennock.....Bordentown, N. J.
D. P. Shreve.....Communipaw, N. J.
J. H. Schultz.....Donaldson, Pa.
Jno. Saylor.....Easton, Pa.
E. Applebaugh.....Elizabethville, Pa.
Wm. Pult.....Halifax, Pa.
J. P. Kohler.....Jersey City, N. J.
T. Edwards.....Llewellyn, Pa.
T. B. Hines.....Newberry, Pa.
Jno. Garwood.....Philadelphia, Pa.
J. C. Benckert..... " "
D. C. Blair.....Ralston, Pa.
E. French.....Red Bank, N. J.
J. H. Schultz.....Fremont, Pa.
D. H. Rodney.....Water Gap, Pa.
N. L. Reichard.....Wilkesbarre, Pa.
E. L. Molter.....Williamstown, Pa.

PRESENTATION.

On the 12th of September a number of the shipowners of Yarmouth, N. S., presented Miss Fanny A. Weddleton, W. U. Tel. operator, on her retirement from office, with the following brief address:

"FRIDAY MORNING, Sept. 12th, 1873.

"Please accept the accompanying package from a few shipowners of Yarmouth, as a token of their esteem and their gratitude for the excellent manner in which you so long performed the business of the telegraph office here.

"They wish you much happiness.

"To Miss FANNY A. WEDDLETON."

The address was accompanied by a package, containing a complete set of jewelry and $50 gold—the whole valued at about $200.

The following is Miss W.'s reply:

"YARMOUTH, N. S., Sept. 23d, 1873.

"Mrs. J. Murray Lawson begs to express her heartfelt thanks and gratitude to the shipowners of Yarmouth, who made her so handsome a present on the day of her marriage. But, far above its intrinsic value—great as it is—does she estimate the favorable opinion and expression of esteem by which it was accompanied, and of which it was so substantial and generous a token."

BORN.

WASHBURN.—At Hansells, Ind., Sept. 25th, 1873, to M. E. Washburn, operator J. C. & H. R. R., a son.

MARRIED.

BONNELL—TROW.—At the residence of the bride's father, in Ft. Madison, Iowa, Sept. 18th, 1873, by the Rev. E. . Cady, Geo. W. Bonnell, manager W. U. Telegraph office Ft Madson, Iowa, and Miss Libbie W. Trow, both of Madison.

HARKINS—TUFTS.—In Biddeford, Me., Oct. 6, by Rev. Mr. Rogers, Mr. V. P. Harkins chief telegraph operator of the Eastern Railroad in Boston, and Miss Rose E. Tufts daughter of the late John R. Tufts of Biddeford. Their large circle of friends wish them a pleasant journey and a long and happy life.

LAWSON—WEDDLETON.—At Trinity Church, Yarmouth, Nova Scotia, on the 12th September, by the Rev. J. T. T. Moody, assisted by the Rev. J. R. Campbell, Mr. J. Murray Lawson and Miss Fanny A. Weddleton, of the W. U. Telegraph office, Yarmouth.

SPAFARD—AUSTIN.—At Warren, Ill., Oct. 4th, by Rev. Geo. H. Coit, F. S. Spafard, manager W. U Telegraph office, Warren, Ill., to Miss Hattie Austin, manager P. & A. Telegraph office, Warren, Ill.

WITHINGTON—BRIGGS.—At Springwater, N. Y., Oct. 4th, 1873, by Rev. W. J. Hobbs, Geo. E. Withington, manager W. U. Telegraph office, Springwater, to Laura M. Briggs, of Richmond, Ont. Co., N. Y.

DIED.

SAVILLE.—At Shreveport, La., Oct. 7, 1873, of yellow fever, Alfred Saville, Manager W. U. Telegraph office.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, OCTOBER 15, 1873.

At a meeting of the Directors of the Western Union Telegraph Company, held at the Executive Office, October 9th, the following officers were elected.

WILLIAM ORTON, *President.*

ALONZO B. CORNELL,
AUGUSTUS SCHELL,
NORVIN GREEN,
GEO. H. MUMFORD,
HARRISON DURKEE,
} *Vice Presidents.*

Executive Committee.

WILLIAM ORTON.	JOSEPH HARKER.
JAMES H. BANKER.	EDWIN D. MORGAN.
ALONZO B. CORNELL.	AUGUSTUS SCHELL.
HARRISON DURKEE.	W. K. THORNE.
NORVIN GREEN.	C. VANDERBILT.

FRANK WORK.

To KEEP the service thoroughly informed, it is, of course, essential that the JOURNAL reach every office. This is especially true of new offices, who naturally look to the information provided by the JOURNAL with more than ordinary anxiety and interest. The illness of the Editor, and a sad accident which has recently overtaken him, and which compels him to be, for a time, separated from his duties, may have led to some omissions in the mail entries of the paper. These, it is desired at once to supply. The superintendents are, therefore, requested to mail, at as early a date as possible, *complete lists* of the offices under their charge to which the JOURNAL should be sent. It is also desired that in opening a new office to which the JOURNAL is wanted to be mailed direct, notice be at once given direct to the Editor. These orders will be promptly and carefully attended to, and complaints, now so frequent, may thus be reduced or prevented.

THE attention of Managers is called to the fact, that a special frank is issued to the Directors of the Company, authorizing the free transmission of messages both to and from them. Complaints have been made that, in some instances, such messages have been refused, or charged for. As a list of the Directors is published in the present number of the JOURNAL, there can be no excuse for its recurrence.

A JUST TRIBUTE TO THE INVENTOR OF THE DUPLEX TELEGRAPH.

W. H. Preece, Esq., Divisional Engineer of the English Post-office Telegraphs, and a prominent member of the Institute of Civil Engineers, and also of the newer, but already quite distinguished, Society of Telegraph Engineers, has been publishing, in the *Telegraphic Journal*, a series of highly interesting articles on Duplex Telegraphy, beginning at the very inception of the idea, and coming down through all the various attempts by Gintl, Siemens, Frischen and others, to the successful solution of the problem by Stearns, to whom, in the last number of the *Journal*, he incidentally pays the following tribute. "Duplex telegraphy was thoroughly exhausted in 1856, and with our then means it proved a failure. It has now, thanks to Mr. Stearns, and to our improved means, proved a success; not, however, so much by the reproduction of exploded plans, as by the introduction of methods which are as novel as they are ingenious, and which I shall shortly explain." Words of appreciation like these, coming from so distinguished a source, are very gratifying to us as fellow-countrymen of Mr. Stearns, and must be doubly so to the distinguished inventor himself, to whom they prove that the scientific men of England, who have done so much to advance the science of telegraphy, are not unwilling to accord full credit to their American cousins for what they have accomplished in the same field.

Executive Order No. 150, published in the JOURNAL of August 18th, directed all words following the signature, such as "executor," "manager," "cashier" and the word "answer" or "answer immediately," to be charged for as if forming a part of the body of the message. This simple order seems already to have led to complications in checking, a special check in many cases being given for these added words. There is no necessity for this. The order being understood, the simple statement of the number of words forming the message is all that is necessary. In all such matters brevity and simplicity should be studied, and all methods of work be uniform. Managers will please call the special attention of the operators to this order, so that it may be fully understood by all.

The Telegraphers' Mutual Insurance Association has now been in existence six years. It has done a noble work. Fifty of its members have fallen, four of these within the last few days. Until now there has been no arrest of the prompt payment of assessments. The heirs have been given, without delay, the important aid thus provided and much suffering prevented. Yet, the assessments of the current year have come rapidly. Death has been very busy. We trust the worst is over. Let all take courage. Let the memory of 50 families provided for, and the fact that nearly $40,000 has been freely given by about one-tenth of the W. Union force to the families of their dead comrades, nerve all to bear the burden patiently and nobly. This is a time when those not members might do a generous thing. There are 5,000 men and women who are not members who would do a good thing by sending one dollar each, to strengthen the association, and relieve the pressure upon it. Why not do so?

THE HEROISM OF LABOR.

We have the sad and painful duty of announcing the death of another of the braye band of operators who have fallen victims to the pestilential fever now raging at Shreveport while nobly performing their duty. Alfred Saville, manager at Shreveport, died at twelve o'clock Tuesday night, October 7th, making the fourth death in that office within a month. On the receipt of the intelligence of this death, President Orton sent the following message, whose words of sympathy will be shared by all in the service:

EXECUTIVE OFFICE
WESTERN UNION TELEGRAPH CO.,
October 8, 1873.

JOHN VAN HORNE, *Gen'l Supt.*,
Louisville, Ky.

I can not express my admiration of, and respect for, the men who have sealed their devotion to duty at Shreveport with their lives. The courage which battles with pestilence, to save life and comfort the distressed, is higher and nobler than that which goes to war to destroy it. Please take pains to convey to the family and friends of Mr. Saville, and of the other brave and faithful men who have died there, assurance of my earnest sympathy, which is shared by all the officers of the Company. I desire, also, to be informed as to their family relations, and the circumstances of those who were dependent upon them, to the end that some practical testimony may be given by the Company, of appreciation for the services which these brave and true men have rendered, by an appropriation to meet the necessities of those who have been deprived of the means of support.

It is of no pecuniary interest to the Company to keep the Shreveport office open, as most of the business with that place is done free. But, if others are still willing to face the danger, let neither pains nor expense be spared to keep the lines working.

In view of the fact that our men who go to Shreveport do so in the face of almost certain death, it occurs to me to suggest the propriety of opening an office outside the town, where its benefits will be enjoyed by the people with less risk to our men.

WILLIAM ORTON,
President.

Immediately upon the receipt of the sad intelligence of Mr. Saville's death, the following circular was transmitted by telegraph to all superintendents in the Southern Division:

"LOUISVILLE, KY., Oct. 8, 1873.

It is with the most painful emotions that I announce the decease of Alfred Saville, Manager at Shreveport, La. He died at 12 o'clock last night.

When Rae, and Jackson, and Renicke, our entire force, were stricken down, Mr. Saville, animated, as I believe, by the loftiest motives, tendered his services and proceeded at once to that dangerous post. It was a noble act and has been crowned by a heroic sacrifice.

May he rest in peace and may he receive the reward of the faithful servant.

JNO. VAN HORNE,
Gen'l Supt."

There are still three operators at Shreveport, all of whom have voluntarily tendered their services, viz: Mr. Bernard of Cincinnati, Mr. Davis of New Orleans, and Mr. Smith of Pensacola.

All honor to these noble-hearted men, who, entering upon this unequal contest, tread in the footsteps of the Great Teacher of Galilee and obey at least one of the two commands upon which hang all the law and the Prophets.

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E. S. KEEP.

On the face of a tasteful monument erected in the great cemetery of Pere la Chaise, Paris, is an inscription the translation of which is, "The record of his life is his true monument and glory." Thus all men erect their own statues. A life of honor, fidelity, kindness, will be remembered long after the marble fades, and will often live, it may be unconsciously, in the lives of generations yet to come. We know of no subject more fitting for editorial use, and none which we would more willingly impress on the great body of the brotherhood of the telegraph than the following record of a faithful man now gone to his rest :

OBITUARY.

In the death of Edwin S. Keep the telegraphic fraternity has sustained an irreparable loss. Although a man young in years, his experience in the profession extended over a period embracing well nigh the entire history of this distinctively American enterprise—an enterprise whose magnitude no man comprehended at its birth, and whose infancy is scarcely yet at its full. Twenty-two years back, when, as a lad of fourteen, Mr. Keep attached himself to the Troy, N. Y., office, in the capacity of messenger, the Telegraph was little more than an experiment, as to the ultimate success of which serious doubts were entertained, even by liberal and progressive minds. For Mr. Keep the calling had that peculiar and indefinable fascination which many another has felt ; yielding to the charm, he dedicated to its arduous duties the richest days of his life.

With Mr. Keep the ambition to rise in his profession was strong, and in order to achieve this laudable end he was not loth to fulfil its inevitable requirements. Entering the service, at the age of fourteen, as a messenger in the Troy, N. Y., office, at sixteen he was promoted to the duties of an operator in the same office, under the management of Mr. —— Covill ; shortly afterwards he was transferred to Montreal ; close upon the heels of this (those being the days of frequent changes), returning to establish the offices at Millerton and Brewsters, in this State. Subsequently, during his engagement at Philadelphia, Pa., under Manager Bullock, he doubtless laid he foundation of the dread disease which culminated in his premature death : working the almost unprecedented time per diem of from 8 A. M. until 4 A. M. (twenty consecutive hours), for over a year. At this date operators were scarce and companies poor; therefore, in an office having night duties to perform, such additional labor was required of the regular force. The immediate sequence of this exhaustive service was a prostrating illness of nearly a year's duration; after recovering from which, Mr. Keep was, for a brief period, assigned duty at Pittsfield, Mass. At the expiration of this engagement he was transferred to Troy, there to assume the managership of the American Telegraph Company's interests. With the exception of a few months' sojourn in New York, as manager of the Gold Room office of the American Company, Mr. Keep spent the residue of his life in the cities of Albany and Troy, having been, at the time of his death, for seven years manager of the Western Union Telegraph Company's office at Albany, where, by his concise business habits and dignified gentlemanly demeanor, he had gained the confidence of the business public in a singularly marked degree. We cannot, perhaps, eulogize him as a manager, more than to add, that while giving entire satisfaction to the executive officers of the Company, he uniformly retained the esteem and respect of those under his supervision. There is one test which never fails to fathom the sweetest, purest depths of a man's character, and that is his fireside life. Few could stand this test so grandly as could Edwin S. Keep. Those who knew him in his sacred family relations saw the brightest side of his character ; his nature craved affection of wife, children and dear ones, as plant life the electric sunshine. In the last of his hours on earth was the distinguishing trait most apparent. Firmly grounded in that faith which is an anchor to the soul, sure and steadfast, of his own future there was no disturbing doubt; all thought, all concern was for those most dear to him. The hope of heaven was only the more precious to him, from the glimpses of it he had caught on earth. Mr. Keep's conjugal relations were most felicitous. Wedded, at the early age of nineteen, to Miss Eliza Van Schaick, of Troy, N. Y.—she being then eighteen—this twain bravely faced the stern realities of a practical, unromantic life ; to them the task had in it nothing of heaviness ; theirs were light hearts and willing hands, and, too, they had learned early the golden value of "faith," that the darkest clouds have the fleeciest silvery linings. The husband had no secrets from the wife. They met the sunshine and shadows together ; with his family his best and truest life found frank, full expression. None could witness his affectionate and considerate kindness, as a husband and father, without a sensation of the keenest pleasure. Sad as it may seem for one, still so young, to fall as a victim of the remorseless scythebearer, we yet realize that "God's ways are not our ways, nor His thoughts our thoughts." And we sincerely believe that the bereaved family of the deceased will have the deep and heartfelt sympathy of the telegraphic fraternity, and that his memory will be universally revered among us.

At a meeting of the employés of the Western Union Telegraph Company's Albany, N. Y., office, held on Wednesday, October 1st, 1873, the following resolutions were unanimously adopted :

Whereas, It has seemed good to the Disposer of all things to call to his everlasting rest our esteemed manager, Edwin S. Keep, we feel called upon, both by the solemnity of the event and the deep loss we have sustained in the decease of one so beloved and useful, to record our feelings respecting this common affliction, by the passage of the following resolutions :

Resolved, That in the death of Edwin S. Keep the Company has been deprived of a faithful and efficient servant ; that the employés of this office lose a true and faithful friend, and that the city of Albany is bereft of an upright and honorable citizen.

Resolved, That although we shall never more see his commanding form in our midst, his many admirable traits of character have so endeared him to us that his memory will ever be cherished.

Resolved, That while deeply feeling and mourning our loss, we know that language would be inadequate to convey to his saddened and afflicted family the consolation which might soothe them in this their bereavement. We commend them to the care of Him who has said, "Leave thy fatherless children, I will preserve them alive, and let thy widow trust in me."

May the Divine Providence, in its infinite mercy, soften to the sufferers the shock of this sad event, and lift the cloud that has darkened their pathway.

S. C. RICE,
S. C. SHELDON,
J. R. VAN WORMER,
GEORGE C. THOMPSON,
ANTHONY HEDLEY,
} *Committee.*

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 Broadway, New York.
October 15, 1873.

To all Offices on W. U. Lines :

On and after November 1st, 1873, unless otherwise directed by special notice before that date, the Local, Square and State Rates (with the exception of the rates named below) will be used on all business between Western Union offices of the Eastern, Central and Southern Divisions west of New Brunswick.

NOTE.—The following list gives the present rates to the points named. It is intended that these rates shall not be changed by the above order:

Exceptions.

Navy Yard, Washington, D. C., 10 cents more than rate to Washington.

Houlton, Me., 25 cents more than rate to Woodstock, N. B.

Astoria, Brooklyn, Flatbush, Fort Hamilton, Hunter's Point, Greenpoint, South Brooklyn and Williamsburg, L. I., 15 cents more than rate to New York City. Offices on Long Island will charge the local or square rates to the above-named Long Island offices.

Birmingham, Alleghany Co., Pa., 15 cents more than rate to Pittsburgh.

Manchester, Pa., 10 cents more than rate to Pittsburgh.

Paxton House, Pa., 45 cents more than rate to Oil City.

Germantown Junc., Pa., 10 cents more than rate to Philadelphia.

The following changes and additions have been made since the date of the last circular :

GENERAL INFORMATION.

Milner, Ala., closed.

Argenta, Ark., closed.

Hereafter the "tariff for other lines" from Little Rock, Ark., to Arkadelphia will be 75 and 5.

Auburn, Ala., closed.

Macon Station, Ala., re-opened ; square 304.

Yosemite Valley, Cal., re-opened ; "tariff for other lines" 60 and 30 from Sonora, Cal. ; check San Francisco.

Telegraph communication with Darien, Ga., is interrupted. Business for Darien will therefore be mailed at Brunswick, Ga until further notice.

Messages may be taken for the Insane Asylum near Milledgeville, Ga., and for Midway, Ga., to be delivered from Milledgeville. Charges for delivery 5 cents for either point.

Carr, Ill., closed.

Atkinson, Ind., re-opened.

Corunna and Millersburg, Ind., are at present kept open at night only.

Hereafter the "tariff for other lines" from Chicago, Ill., to Decorah and Ridgeway, Iowa, will be 75 and 5.

Julien, Iowa, closed.

Linkwood, Md., re-opened.

The P. O. address of Cohasset Narrows, Mass., is Monument Mass.

Burr Oak, Mich., office is at present kept open at night only.

Utica, Mich., is now an Other Line office; "tariff for other lines" 30 and 2 from Detroit.

Douglass, Mich., closed.

Osseo, Mich., closed.

Riga, Mich., closed.

Plaistow, N. H., re-opened.

Asbury Park, N. J., closed.

Lebanon, N. J., closed.

Port Oram, N. J., closed.

Business for Deal, Ocean Grove, and Asbury Park, will hereafter be delivered by stage from Long Branch, N. J. Charges for delivery 25 cents. Charges for delivery should be prepaid.

Hereafter the "tariff for other lines" to Mexico., N. Y., will be 15 and 1 from Oswego, N. Y.,

Trenton Falls, N. Y., closed.

Five Mile Point, Otsego Lake, N. Y., closed.

Overlook Mountain House, N. Y., closed.

Amherst, O., office changed to North Amherst, O.

The P. O. A. of Lawrence, O., (given Laurence in Tariff Book) is North Lawrence, Stark Co., O.

Stryker, Ohio., office is at present kept open at night only.

Clifton House, Ont., closed. Business for the Clifton House can be delivered from Niagara Falls, N. Y., at a charge for delivery of thirty-five cents.

Fort Washington, Pa., closed.

New Cumberland, Pa., closed.

Minnequa Springs, Pa., closed.

Calvert, Texas, closed.

Dekalb, Texas, closed.

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Sulphur, Texas, closed.
Hot Springs, Va., closed.
Montgomery, White Sulphur Springs, Va., closed.
Sweet Chalybeate Springs, Va., closed.
Blue Ridge Springs, Va., closed.
Sweet Springs, W. Va., closed.

Communications relating to checks or the business of the White Mountain "Summer" offices in N. H., *now closed*, should be addressed to Geo. W. Gates, Dist. Supt. White River Junction, Vt.

NEW OFFICES.

360 Moark, Ark.
* Greenwood, Cal. 30 10 Georgetown, Cal., check San Fr.
* Los Banos, Cal. 60 30 San Juan, S. Cal. " "
378 Fall Creek, Ill.
318 Isabel, "
316 McHenry, "
315 Pesotum, "
376 Maynard, Iowa.
386 West Union, Iowa.
339 Fulton, Ky.
* Louisa, Ky. 50 3 203 Catlettsburg, Ky.
179 Sebewaing, Mich.
179 Unionville, "
200 Utica Plank, "
370 Annapolis, Mo.
41 Ramseys, N. J.
409 Pleasant Green, Mo.
36 Buskirks, N. Y.
83 Coopers, "
180 Black River, O.
159 Fowler, O.
180 Fulton, O.
191 Gambier, O.
159 Kinsman, O.
180 Medina, O.
186 Russell, O.
180 Warwick, O.
150 Williamsfield, O.
241 Woodburn, O.
59 Christiana, Pa.
330 Frost's Station, Tenn.
* Texarkana Junc., Texas. 65 4 470 Marshall, Texas.
75 5 510 Sherman, "
* Moore's Landing. 65 4 470 Marshall, "
75 5 510 Sherman, "

ATLANTIC CABLE BUSINESS.

The following is a revised list of places beyond Great Britain, Ireland and France. The rates given are to be added to the rate to France as at present:

	For 20 words or less.
Aden	$15 00
Africa (South)—"Mail Southampton telegraph forward." These charges include postage from Southampton to the Cape of Good Hope.	
" " Simon's Town	1 00
" " Caledon	1 12
" " Swellendam	1 25
" " Riversdale	1 50
" " Mossel Bay	1 75
" " George	1 88
" " Avontuur	2 00
" " Humansdorp	2 38
" " Uitenhage	2 50
" " Port Elizabeth	3 00
" " Grahamstown	3 62
" " Fort Beaufort	3 62
" " Lovedale for Alice	3 62
" " King William's Town	4 00
" " East London	4 38
" " Diamond Fields, including—Bloemfontein, Kilpdrift Pnell, Victoria, Jacob Dahl, Bultfontain, Fauresmith	3 00
Algeria and Tunisia, via Marseilles	1 60
" " " Malta	3 62
Australia—Port Darwin	46 62
" New South Wales	47 88
" South Australia	46 62
" Victoria	47 12
" Tasmania and Queensland	49 12
Austria and Hungary	1 50
Baden	1 50
Belgium	0 84
Beloudchistan	18 00
Benghazi—Cable abandoned; messages should be posted at Malta.	
Bushire	6 12
" via Turkey	7 38
Ceylon	21 00
Channel Islands (if via France)	$1 66
China—Hong Kong, Amoy, Shanghai } by all routes	30 00
To other places in China messages can be posted from Hong Kong or Shanghai without extra charge.	
Cochin China—Saigon	28 50
Corfu	2 50
" via Falmouth	4 38
Corsica	1 04
Denmark	1 40
Egypt, via Malta—	
Alexandria { 10 words	5 80
Alexandria { 20 "	7 50
Cairo and Suez { 10 "	5 90
Cairo and Suez { 20 "	8 50
Suez Canal and Isthmus of { 10 "	5 90
Suez Canal and Isthmus of { 20 "	8 50
" via Turkey—	
Alexandria	6 46
Suez	6 46
Cairo	6 46
Suez Canal and Isthmus of	7 20
France	
" via Falmouth	4 38
Germany, except Baden and Wurtemburg	1 10
Gibraltar	2 75
Greece, via Volo	2 25
" " Corfu	3 34
" " Falmouth	5 00
Greek Islands—	
Ithaca, Cephalonia, St. Maure, Zante, Spezzia { via Volo	2 84
" " " " Corfu	3 66
" " " " Falmouth	5 38
Syra, via Volo	3 12
" " Corfu	3 96
" " Falmouth	5 38
Candia—	
Candia, Canea, Retimo, via Constantinople	4 80
" " " " Volo	6 25
" " " " Falmouth	6 50
" " " " Corfu	7 08
" " " " Falm. & Corfu	7 62
Cyprus, via Constantinople	4 16
" " Volo	5 62
" " Corfu	6 46
" " Falmouth	6 00
" " Falmouth and Corfu	7 00
Mytelene, Rhodes, Samos, via Constantinople	3 96
" " " " Volo	5 42
" " " " Corfu	6 25
" " " " Falmouth	5 75
" " " " Falm. and Corfu	6 88
Scio, via Constantinople	3 96
" " Volo	3 96
" " Corfu	4 58
" " Falmouth	5 62
" " Falmouth and Volo	5 75
Andros, Kythnos, Tinos, } via Volo	5 50
" via Corfu	5 75
Hohenzollern	1 10
Holland	1 00
Hungary	1 50
India, West of Chittagong, and Kurrachee	20 00
" East "	21 00
Italy and Sicily	1 88
" " via Gibraltar	3 75
Japan [if written in ordinary language]—	
Nagasaki, via Falmouth, Teheran, or Siberia	40 38
Hiogo, Osaka, Simonosaki, Yeddo or Yokohama, via Falmouth, Teheran or Siberia	43 00
Japan [if written in code or cypher]—	
Nagasaki, via Falmouth, Teheran or Siberia	40 38
Hiogo, Osaka, Simonosaki, Yeddo or Yokohama, via Falmouth, Teheran or Siberia	45 62
Java, Batavia and Weltervreden	29 88
West of Samarang	30 12
East "	30 62
Luxembourg	1 50
Malta	2 50
Mauritius, Telegrams for the Island of, can be posted Aden.	
Montenegro	1 62
New Zealand. Messages can be posted at Melbourne or Sydney.	
Norway	1 80
Orkney Islands	1 50
Penang	23 50
Persia	$6 12
" via Falmouth	9 00
" via Turkey	7 08
Portugal	2 00
" via Falmouth	2 12
" " Bilbao	2 25
Prussia	1 10
Roumania	1 88
Russia in Europe	2 50
" Caucasus	3 12
" West of Tomsk	4 16
" East of " and West of Werkhne Oudinsk	5 84
Russia—East of Werkhne Oudinsk	9 16
Scilly Islands	0 88
Servia	1 88
Shetland Islands	1 75
Singapore	27 50
Spain	1 75
" via Falmouth	2 00
" via Bilbao	2 00
Sweden	1 75
Switzerland	1 46
Tripoli—Cable abandoned; messages should be posted at Malta.	
Turkey in Europe	2 25
" " via Falmouth	4 50
" Asia—	
Seaports, via Constantinople	3 12
" " Volo	5 00
" " Corfu	5 84
" " Falmouth	5 38
" " Falmouth and Corfu	6 50
Inland, via Constantinople	3 96
" " Volo	5 84
" " Corfu	6 66
" " Falmouth	6 12
" " Falmouth and Corfu	7 25
Wurtemburg	1 50

The route to Australia, *via Falmouth* and *via Teheran*, is again open, the Madras and Penang Cable having been repaired.

The Cable between Singapore and Hong Kong is broken. Messages for China and Japan must be forwarded for the present *via Siberia*, or mailed at Singapore.

WILLIAM ORTON,
President.

The Galvanometer and its Uses; a Manual for Electricians and Students, by C. H. Haskins, with illustrations. D. Van Nostrand, 23 Murray street, N. Y. 18mo., pocket form. Price, $2.

This work, which comes to us just as we go to press, commends itself, both by its subject, design and appearance, to students of electricity. We quote from the preface as follows: "The author has endeavored to present, in a condensed form, a statement of electrical laws and rules for measurement, written in a plain, brief manner, together with such tables and simple formulæ as will enable any student, with a little practice, to make land measurements with despatch and accuracy." Mr. Haskins is well known as a writer of ability and experience, and has supplied a want which will secure him the thanks of all concerned. See advertisement.

The Eastern Extension, Australasia and China Telegraph Company's traffic receipts for the month of July amounted to £18,190.

EFFECTS PRODUCED BY LIGHTNING AT TROYES, ON JULY 26, 1873.—*M. Parent.*—One interesting feature is the appearance of several balls of fire. One falling before a young woman, rolled along the street, then disappeared; while hair pins, and other pieces of metal about her person, were violently torn out. Other incandescent bodies were afterwards found in a cooled state; one was like a piece of calcined stone, but was surprisingly light; some parts of it were dirty grey with black points, others redish with bright reflection. The lightning produced some curious effects on a public building in the place.

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THE GALVANOMETER

AND ITS USES.

A MANUAL FOR

ELECTRICIANS AND STUDENTS,

By C. H. HASKINS,

WITH ILLUSTRATIONS,

18mo. pocket form, Morrocco tuck, - - $2.00.

D. VAN NOSTRAND Publisher,

23 Murray St. and 27 Warren St.

*** Copies sent free by mail, on receipt of price.

LECLANCHÉ BATTERIES.

CAUTION.

All persons are hereby notified that Batteries

INFRINGING UPON OUR PATENT

are in the market (some of them nearly worthless). The Public are warned against using any such infringement, as in every case the guilty parties will be prosecuted to the fullest extent of the law. The GENUINE BATTERIES have the words "PILE LECLANCHÉ" on the Carbons and Glasses. Any information concerning such infringements will be thankfully received by the

LECLANCHÉ BATTERY CO.,

No. 40 West 18th St.

NEW YORK, Oct. 11th, 1873.

—Recent experiments on the heat of the electric spark indicate that it is between 10,000 and 15,000 degrees Centigrade.

THE FIRST PRINTED BOOK.—The first book ever printed was the Book of Psalms, by Faust & Schaffer, A. D. 1457. It was printed on one side only of the leaves, after which they were, in the binding, pasted back to back.

THE statistical man proves that a person in the United States is six times as likely to kill himself as lightning is to kill him.

The first lightning-rod used in the world for the protection of a building from danger by lightning was set up by Benjamin Franklin, at his dwelling-house, south-east corner of Second and Race Streets, Philadelphia, in September, 1752.

WATTS & COMPANY,

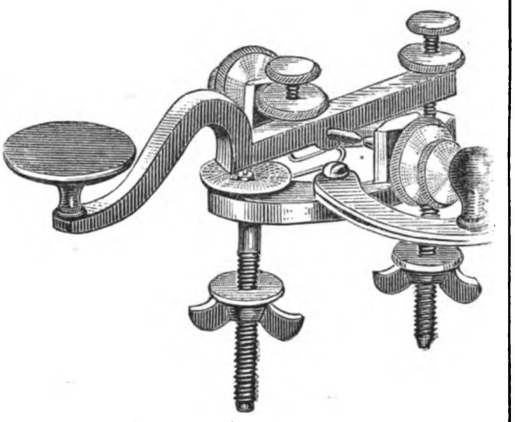
47 Holliday Street,

Baltimore, Md.,

SOLE MANUFACTURERS OF THE

PATENT CIRCUIT-CLOSER KEY,

Which has met with marked success.



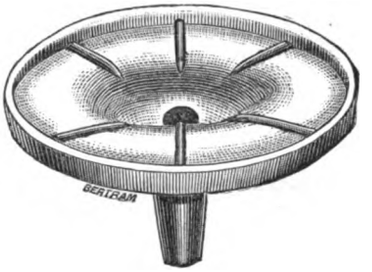
Price, $5 50 plain; $7 nickel-plated.

The following is from a competent judge, written after some weeks' trial.

145 BROADWAY, NEW YORK, Sept. 22d, 1873.

DEAR SIR,—Your circuit-closing attachment on the key, left with me for trial, is pronounced by all who have used it a decided and much-needed improvement on the common form.

Respectfully,
A. S. BROWN, *Manager.*



The Best Form of Battery Insulator Offered.

SIMPLE AND PERFECT.

Made of porcelain, handsome in appearance. Occupies little more space than the cell it supports. Each cell of battery completely isolated. Leakage is reduced to the minimum by the use of it.

General Superintendent Van Horn, Southern Division W. U. Tel. Co., writes of it:

"We have now in use a thousand or fifteen hundred of your battery insulators, and expect to order many more before the close of the year.

We have never used any battery insulator that equals it in any respect. In fact, it appears to be as near perfect as we can reasonably expect, in a contrivance for that purpose."

Price 40 cents

We offer a very excellent article of Galvanized Wire, superior to any in the market. The linemen on Baltimore and Ohio R. R. say they have never seen its equal for toughness and flexibility.

Special attention given to building.

Estimates given for any amount of material for telegraph construction or extension.

SWITCHES, GALVANOMETERS, RESISTANCE COILS, &c., to order.

Designs for Switch Boards for special service furnished.

SCOTT'S PATENT ANNUNCIATOR,

for Hotels and Residences.

PENSACOLA TELEGRAPH CO.

C. L. LE BARON, *President.*

CHARLES LE BARON, JR., *Sec'y and Treasurer.*

PENSACOLA, FLORIDA.

OFFICES IN

PENSACOLA, FLA. FERRYPASS, FLA.
MOLINO FLA. MILTON, FLA.
PENSACOLA JUNCTION, FLA. BAGDAD, FLA.

Connect with the lines of the WESTERN UNION TELEGRAPH COMPANY at Pollard, Ala.

Governed by the same Rules and Regulations as the Western Union Telegraph Company.

WATTS & COMPANY,

47 Holliday Street,

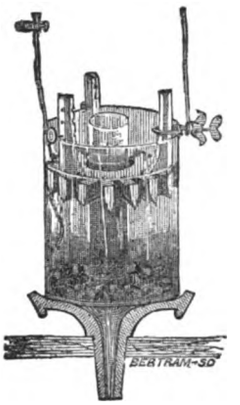
Baltimore, Md.,

MANUFACTURE

Telegraph and Electrical Instruments

OF EVERY DESCRIPTION.

Facilities for supplying any description of Machinery or Material equal to any in the United States.



Patented Dec. 31, 1872.

Over SIX THOUSAND cells of the Baltimore Battery in use by the Gold and Stock Telegraph Company of New York in their Private Line Department, is a sufficient acknowledgement of its merit, as a form of the gravity battery, combining the valuable principles of

Economy, Cleanliness and Constancy,

"—in fact a base-burner."

F. L. POPE,
Telegrapher, July 5th, '73.

SELF-FEEDING,

No Sulphate of Copper can reach the Sulphate of Zinc Solution.

The shape of Zinc and Copper, which, with the tube, were patented December 31st, 1872, secures the largest surface with least weight of the metals. Half pound sulphate copper per month, ample supply for No. 2, or 3.

Following is one of the many letters we have from reliable telegraphers:

PIEDMONT, W. Va., September 28th, 1873.

Messrs. WATTS & Co.,
Baltimore, Md.

GENTLEMEN:—On January 1st, 1873, I put up 75 cells of your No. 2, Baltimore Battery, in place of 40 cells of carbon, from which two railroad wires of 100 miles each, are supplied. It has not since been taken down or cleaned, and has required no attention, except to fill the tubes with blue stone, once each month, and replenish the fluid once or twice during this period, made necessary by evaporation.

I am fully convinced, from long experience, that this is superior to any other form of the gravity battery.

It has now been in constant use for nine months, and will not need new zinc until after January next.

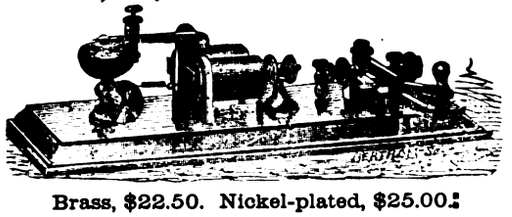
Respectfully,
J. G. NESBITT, *Manager.*

ORDERS FOR THIS BATTERY PROMPTLY FILLED.

A large stock constantly on hand.

No. 1 for Electro-motors, R. R. signals or similar service,	$2.25
No. 2 ordinary local or Printing Telegraph main	$1.75
No. 3 ordinary main	$1.25

A very Superior Main Line Sounder.



Brass, $22.50. Nickel-plated, $25.00.

For wrecking purposes or temporary offices, this instrument is without a rival.

A perfect combination, handsome, good-sounding instrument.

NO LOCAL REQUIRED.

Well seasoned black walnut box, large enough for pencils, paper, plyers and office wire, in addition to the instrument, $4. Larger size for climbers, vises, &c., $5.50.

RELAYS, SOUNDERS AND KEYS,

always on hand, plain or plated.

Our Challange Sounder is the noisest instrument made.

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THE BEST TELEGRAPH MATERIAL IN THE WORLD

IS SUPPLIED BY

L. G. TILLOTSON & CO.,

8 Dey Street, New York,

MANUFACTURERS, DEALERS and IMPORTERS

OF

TELEGRAPH MACHINERY, SUPPLIES

AND

Line Equipment of every Description.

MATERIAL AND INSTRUMENTS

always on hand, for the equipment of lines of any length, at a moment's notice.

We furnish first-class goods at low prices. Liberal arrangements made with Superintendents, Contractors and Builders of Telegraph Lines.

Registers	$38 00 to $45 00
Spring Registers	47 50 .....
Relays	14 00 to 18 00
Sounders	3 50 to 7 50
Keys	4 00 to 6 50
Main Line Sounders	14 00 to 18 00
Combination Sets	20 00 to 30 00

Galvanometers, $7 00 upward.

POCKET INSTRUMENTS, Nickel Plated, in Hard Rubber Cases, 1¼x2x5 inches.

CUT-OUTS, Plug, Peg or Button, with or without Lightning Arresters, for one, two or more Lines.

JONES' PATENT LOCK SWITCHES, the best and cheapest in use, with or without Lightning Arresters.

PEG or PIN, CULGAN, REPEATING, GROUND, LOCAL, BATTERY and SINGLE BUTTON SWITCHES.

LIGHTNING ARRESTERS for any number of wires, of most approved patterns.

Electro-Magnets,
Permanent Magnets,
Apparatus for Students and Amateur Telegraphers,
Electric Motors,
Printing and Dial Instruments,
Electrical Annunciators,
Fire and Burglar Alarms,
Electro-Medical Instruments.

RHUMKORFF COILS, from ¼ to 10 inch spark.

GEISSLER'S TUBES, from $1.00 upward.

ELECTRICAL CALL AND ALARM BELLS in great variety, from $6.50 upward.

INSTRUMENTS furnished, Nickel Plated, at 20 per cent. advance on List Prices.

OFFICE WIRES, from 80c. to $1.25 per pound.

GUTTA-PERCHA COVERED WIRES, all sizes.

BISHOP'S NEW COMPOUND COVERED WIRE, for running into offices, 4c. per foot.

MAGNET WIRES, in Silk and Cotton, at Factory prices.

INSULATED WIRES for special purposes made to order.

SILK COVERED SWITCH CORD, one, two or more conductors.

PATENT MESSAGE HOOKS, the best ever introduced, prices 65c. and 75c. per dozen.

MANIFOLD PAPER and AGATE STYLUS at bottom prices.

Cables and Submarine Wires.
Repairers' Tools and Tool Bags.
Glass and Rubber Window Tubes.
Insulators of every Description.
Brackets, Pins and Spikes.

HILL, CALLAUD, GROVE, BUNSEN, CARBON, DANIELLS, LE CLANCHE, NITRO-CHROMIC, AND OTHER STYLES OF BATTERY IN ANY QUANTITIES.

PURE CHEMICALS AT LOWEST PRICES.

SULPHATE OF COPPER A SPECIALTY, AND PRICES VERY LOW.

CARBON PLATES made to order for Grenil, Smee, Stohrer and other Batteries.

OFFICE FIXTURES AND BATTERY UTENSILS OF EVERY DESCRIPTION.

Smith's Manual of Telegraph," - - - - 30 cents.

ALL STANDARD WORKS on ELECTRICITY AND TELEGRAPHY.

SOLE AGENTS FOR

RICHARD JOHNSON & NEPHEW'S celebrated LINE WIRE.

Catalogue and Price List furnished on application.

L. G. TILLOTSON & CO.,

8 DEY STREET, NEW YORK.

F. L. POPE & CO.

Manufacturers and Dealers in

Telegraph Instruments and Supplies

OF EVERY DESCRIPTION,

38 Vesey Street, New York.

New and Superior patterns of

STANDARD TELEGRAPH INSTRUMENTS.

Their RELAYS, SOUNDERS, and KEYS which have been specially designed by Mr. F. L. Pope, are elegantly designed, thoroughly well finished and scientifically adapted to the service required and are recommended as SUPERIOR TO ANY HITHERTO OFFERED.

In addition to these ALL DESCRIPTIONS OF TELEGRAPH MATERIALS AND SUPPLIES are furnished, such as

INSULATORS, BATTERIES,
INSULATED WIRES,
CHEMICALS., ETC, ETC.

MAGNETIC AND DIAL INSTRUMENTS.

We have for sale also THE NONPAREIL TELEGRAPH INSTRUMENT for amateurs, learners and short lines.

A COMBINATION SET, comprising Sounder and Key on a handsome rosewood base.

Bradley's Box Relays and Sounders.
Bradley's Apparatus for Electrical Measurement.
Bradley's Naked Wire Helices and Magnet Spools to order.

any desired size and resistance, at manufacturers' lowest price.

Descriptive Circular and Price Lists forwarded upon application to

F. L. POPE & CO.,

P. O. Box 6010 *38 Vesey St., N. Y.*

THE LECLANCHE BATTERY CO.

Offer for Sale this celebrated Battery,

(SECURED BY LETTERS PATENT,)

Of which they are the exclusive owners in this country.

Over 300,000 are now in use in Europe,

and have recently been adopted by the French Government in preference to the Calland, which had been used by them for several years.

WE RECOMMEND THEM FOR

Telegraphy (open circuit), Railroad Signals, Hotel Annunciators, Burglar Alarms, Electric Bells, Clocks, &c.

AMONG ITS NUMEROUS ADVANTAGES ARE—

ABSENCE OF ACIDS AND SALTS OF COPPER,

ITS GREAT CLEANLINESS,

WONDERFUL DURABILITY,

ECONOMY IN RUNNING EXPENSES,

ENTIRE ABSENCE OF ODOR.

This Battery will last without any attention from six months to three years.

A large number of Cups are already in use in this country on Burglar Alarms, Electric Bells, &c., and are giving entire satisfaction. The Western Union has a number of Cups put up November 26th, 1872, that are still running.

For further particulars apply to

THE LECLANCHE BATTERY CO.,

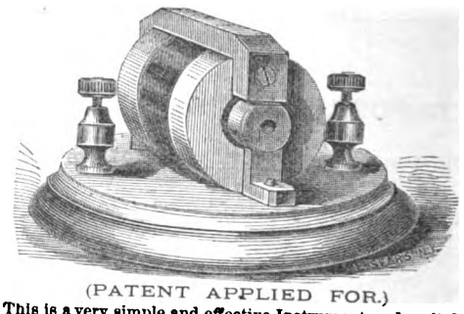
No. 40 West Eighteenth Street.

L. G. TILLOTSON & Co., Sole Agents,

No. 8 Dey Street, New York.

SOMETHING NEW.

"The Rattler" Telegraph Sounder.



(PATENT APPLIED FOR.)

This is a very simple and effective Instrument, and, as it does not require any spring to draw the lever back, is always adjusted.

PRICE, - - - - $3.50.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N. Y.

TILLOTSON'S

MAIN LINE SOUNDERS

AND

BOX RELAYS,

NICKEL PLATED OR IN BRASS.

Illustrated on page 64 of our Catalogue.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N. Y.

TILLOTSON'S

NICKEL PLATED INSTRUMENTS.

We furnish all our machinery Nickel Plated at a small advance over the price of the same articles in Brass.

L. G. TILLOTSON & CO.,

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GEO. H. BLISS & CO.

SUCCESSORS TO

BLISS, TILLOTSON & CO.,

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CHICAGO, ILLINOIS,

MANUFACTURERS AND DEALERS IN

Telegraph Machinery and Supplies,

GALVANIZED AND PLAIN WIRE,

INSULATORS,

AND EVERY DESCRIPTION OF

OFFICE AND BATTERY MATERIAL

ALWAYS ON HAND.

INSTRUMENTS REPAIRED AT SHORT NOTICE.

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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 23. NEW YORK, NOVEMBER 1, 1873. WHOLE NO. 144.

ELECTRO-CHEMICAL COPYING TELEGRAPHS.

Copying Telegraphs have never been practically employed, to any considerable extent, in the transmission of messages. The reason of this is partly because they work too slowly to be adopted with profit in the transmission of ordinary messages, and partly because occasions requiring the production of fac-similes present themselves very rarely.

All chemical copying telegraphs are based upon the electro-chemical system of Bain, differing from him, and from each other, only in the mechanical detail of construction.

In 1850, Mr. F. C. Bakewell, of London, brought out his system of copying telegraph, by which dispatches were transmitted in the handwriting of correspondents. In this apparatus (Fig. 1.) a clock-work is supported between the plates, M, M¹, which puts the cylinder, C, in motion simultaneously with the screw, S, of the same length as the cylinder, and carrying a nut, *q*, with style and connection, *r*. When the cylinder is turned by the clock-work, therefore, the style travels up or down the cylinder, according to the direction of rotation of the latter, thereby marking a spiral line whose convolutions are close together.

The dispatch to be transmitted is written on tinfoil, with a pen dipped in varnish. The letters thus written form on the conducting metal surface a number of non-conducting marks, sufficient to interrupt the electric current, though the deposit of resinous matter is so slight as not to be perceptible to the touch.

The message on tinfoil is fixed round the cylinder, C, at the transmitting instrument, which instrument is a counterpart, in its mechanical arrangements, of the receiving one, and either of them may be used to transmit or receive messages. The metal style, *r*, in connection with the battery, presses on the tinfoil, and is carried along by an endless screw as the cylinder revolves, exactly in the same manner as the steel wire that draws lines on the paper on the receiving instrument. The varnish writing, when it interposes between the style and the tinfoil, stops the electric current; consequently, at every part where the electric current is stopped by the varnish at one instrument, the steel wire ceases to make marks upon the paper at the other station. Both cylinders are so regulated that they rotate exactly together; therefore the successive breaks of the electric current by the varnish letters cause corresponding gaps to be made in the lines on the paper; and the succession of these lines, with their successive gaps where the letters occur, produces on the paper of the receiving instrument the exact forms of the letters. The letters appear of a white or pale color on a ground of blue lines, there being about nine or ten lines drawn by the wire to make one line of writing.

Bakewell used an electro-magnetic governor to attain synchronism in the movements of the two apparatus, without which it would certainly have been impossible to have obtained any dependable results.

M. Charles Cros, of Paris, has invented a chemical copying telegraph, which differs in construction from that of Bakewell in the style traveling round the cylinder, instead of the latter turning underneath the style, and in the adjustment of the synchronism six times during every revolution. The apparatus consists of a clock-work, driven by a heavy weight, and giving a horizontal motion to the cylinder, and a rotary motion to an axis carrying the style. The style is fixed to the end of an elbow-piece, and travels round the cylinder, always in the same plane; but as the cylinder, when the apparatus is in motion, is moved sideways, the style describes upon its surface a long line in the form of a close helix. The styles of the two apparatus do not move regularly, but are arrested and released six times in every revolution, for the purpose of regulating the synchronism.

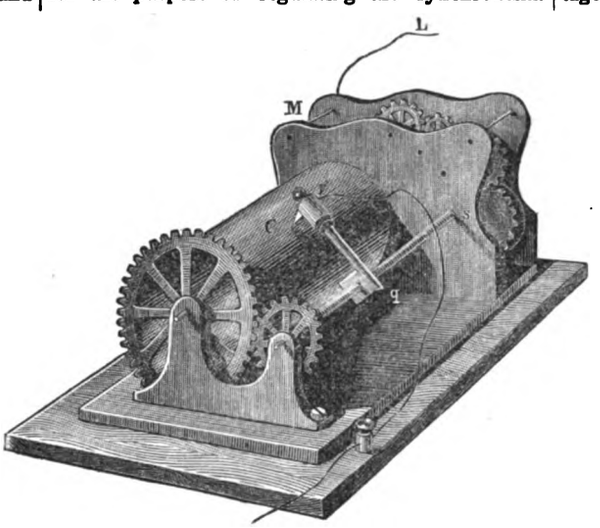


Fig. 1.

When one apparatus goes faster than the other, its style is arrested by the armature of an electro-magnet, until the slower one has come up with it and closed the circuit, which releases them together.

THE CHICAGO EXPOSITION.

During the past three weeks the people of the West and North have had an opportunity of witnessing an exposition far surpassing anything of the kind ever held in this country. One would think that all the inventive genius and mechanical skill of the world had been devoted to the end that Chicago might present to the country an Exhibition, after which Cincinnati, Indianapolis, and other places, which have been entertaining the people with something of the kind, might model with advantage.

Here may be found every kind of labor-saving machinery of which the Patent Office has any knowledge, and every variety of product the soil and climate of America will produce. Here, also, may be seen the wild buffalo just from his native haunts, and the wild duck in his accustomed element.

But your readers will, probably, be more interested in learning what is on exhibition to represent the progress of telegraphy and the novelties of electrical science. This branch of the Exposition is represented by three Companies—the Western Electric Manufacturing Company, Geo. H. Bliss & Co., and the Electric Improvement Company. The Western Electric Company, having much the largest capital and the most extensive shops, of course makes the finest display. This Company was organized but little more than one year ago, yet during that time they have bought the Western Union Telegraph Co.'s shop and machinery at Ottawa, Ill., and added an immense amount of new machinery, much of which was modified and adapted, in its construction, to the manufacture of electrical work exclusively. The advantage of this is seen from the fact, that all telegraph supplies, such as relays, sounders, keys, &c., are turned out almost entirely without manual labor in filing, polishing, boring and screw cutting. In fact, it is like putting the brass and iron into a machine at one end and almost instantaneously taking it out of the other a finished instrument. Under the wise supervision of its President, General Anson Stager, assisted by Mr. E. Gray, superintendent—than whom no better electrician and mechanic can be found—this Company seems to have gained control of the electrical trade of the West.

THE WESTERN ELECTRIC COMPANY.

The space assigned the Western Electric Company at the Exposition Building has been tastefully fitted up, and everything so conveniently arranged that visitors can examine in detail the construction and working capacity of every article. As we approach the stand, an elegant show case first attracts attention. In this may be found Morse telegraph machinery, of every style and finish—brass mounted and nickel plated, rubber-tipped and ivory-pointed; common relays, box relays, local sounders, keys, cut-outs, switches, and everything calculated to invite a current of electricity from the battery to the line.

To the left of this we find Hamblet's Electro-magnetic Watch Clock, adapted to keeping a record of the movements of watchmen around buildings during any number of hours they may be on duty, and at the same time run any number of dials attached thereto.

GRAY'S PATENT PRINTERS.

Leaving this, we are confronted by a set of Gray's Patent Printers, connected into a circuit to better exhibit their merits. This instrument requires no description; its general use on hundreds of private lines in the West has established its superiority over every other printing instrument, and the demand in

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the East, I understand, is at present greater than the Company can supply. The advent of this printer numbered the days of dial instruments, and laid them up as relics of the past. Two of these instruments on exhibition are elegantly nickel-plated and highly finished, and are perhaps as fine a piece of workmanship as can be found in the building. One fact may be mentioned in regard to these instruments, showing how well they are adapted to the use of private individuals, and that is: since the opening of the exhibition they have been in constant use from morning until night, played upon by boys attracted by curiosity, who never saw anything of the kind before; yet, under all this rough usage, they have not been the least out of repair.

NEEDLE HOTEL ANNUNCIATOR.

The next prominent object is a Needle Hotel Annunciator. The superiority of this pattern consists in its simplicity, having no complicated machinery to get out of order. The numbers are restored by a mechanical motion, the handle for which may be placed at any desirable distance from the Annunciator. In connection with this may be seen a device for detecting a fire at its earliest inception, in hotels or other large buildings, and is called the

MERCURIAL ELECTRIC FIRE ALARM.

It is automatic in its operation, and never fails to give the exact location of the fire. It consists of a small glass bulb, having two upward tubes with a platinum wire in each. The bulb is filled with mercury and one of the wires connects with it. The other wire does not touch the mercury unless the latter is expanded by heat, when an immediate alarm is given.

A pair of Hamblet's Magneto-Electric Dial instruments are also on exhibition, but the success of the Printer detracts somewhat from its merits, and will doubtless preclude its extensive use.

One of the greatest objects of interest to the visitor, and, perhaps, the finest piece of electrical work presented, is

A MAGNIFICENT SWITCH BOARD

and massive frame, constructed for the United States Naval Observatory, at Washington. The board has a capacity for sixty wires, and in style and finish excels anything of the kind ever made in this country. The frame is of black walnut, elegantly carved, six feet wide by ten feet in height, and surmounted with the monogram of the Observatory.

Adjoining this may be seen A LARGE PHONOGRAPH, recently made to order for the Chicago Observatory. The workmanship displayed upon this is in keeping with the reputation of the Western Electric Company for beauty in design and unerring certainty of operation.

I will not trespass further upon your space with a description of articles in this line, although there are numerous other objects claiming the attention of telegraphers. You may see BATTERY MATERIAL of every kind, including Grove, Calland, Bi-chromate, Laclanché, Smee and Maria Davy, the aggregate making a respectable battery of artillery; insulated wire, from No. 10 to No. 50; insulators of every size and pattern, while with climbers, pulleys and eccentrics, one would think the stock complete.

THE TYPE WRITER.

I had almost neglected to mention the Type Writer. This instrument, patented by Sholes & Glidden, of Milwaukee, Wis., really possesses great merit. In size and shape it is similar to a sewing machine, and is manipulated by a key-board, after the style of the piano. Its capacity is from 75 to 100 words per minute, and is invaluable in every counting room or other place where much copying is to be done.

The Exposition will probably not close for two or three weeks, and those of your readers who have time will never regret the visit, should they atten .

FESTUS.

RECORDING MUSIC.

AN ELECTRIC APPARATUS FOR RECORDING MUSIC WHILE BEING PLAYED.

Efforts for the constructiou of a machine by which music played upon the piano or organ could be reproduced upon paper have been frequently made, but thus far without practical success, at least as far as the organ is concerned. So many musicians find that in moments of inspiration they draw from the instrument sweeter strains and more delightful music than they ever could transfer to paper, that the desire for such a contrivance has been long and universally felt. This need seems now about to be met by a contrivance which Mr. Barnes, a machinist of Bridgeport, Conn., aided by Mr. Guernsey, a manufacturer of electrical machines in Jersey City, is now constructing, to be attached to the organ in the hall which C. T. Shelton, of New Haven has built for his son, Willis C. Shelton, the boy organist. The apparatus is nearly completed, and will be tested at no distant day, and no doubt a description of it will be interesting alike to musicians and machinists.

The organ is connected with the recording apparatus by a magnetic telegraph, and its operation is very simple indead. Beneath each note of the three manuals and of the pedals, and connected with each stop of the organ, is a small brass spring, which is pressed down whever the piece to which it is attached is brought into action. From each spring wires run to a galvanic battery of 12 cells, and to the recording apparatus, which may be situated at any convenient distance from the organ. When the spring is pressed down, connection between the battery and the recording apparatus is formed, and the electric current passes through. The recording apparatus is very simple and similar to that used in Morse's telegraph. Attached to clock-work, by which a uniform motion is produced, are two cylinders some 18 inches in length, between which is carried a strip of paper divided into about 250 longitudinal divisions—one for each note and stop in the organ. Corresponding to each of these divisions is a magnet whose armature carries a lever armed with a style, which indents the paper as long as the electric current is passing through. Now when any note or stop is brought into action the spring connected with it is pressed down, the circuit is completed, the corresponding armature is attracted to its magnet, and the division of the paper belonging to the note struck is indented with a line proportionate in length to the time during which the note is held down. A staccato touch will be represented by a simple dot, while a longer tone will be recorded by a more prolonged indentation. The clock-work is so geared that the paper is carried forward on the rollers at the rate of about one-half an inch per second, thus recording each note in the most rapid playing at the rate of about ten notes per second by a line one-twentieth of an inch in length and longer notes by lines proportionally extended.

The apparatus is simply an immense House's telegraph, except that the symbols are distinguished by their position rather than by their form. It is estimated that about 12 miles of insulated wire will be used in the construction of the machine, and the clock-work is set in motion by a weight of about 500 pounds. The difficulties which the inventors encountered in constructing a machine which would successfully record all the movements of a rapid organist were very great, and many other points were tried before the present one was finally hit upon. A number of experiments were made with a machine operating on the principle of the Bain telegraph, in which the electric current discolors a chemically prepared paper; but it was finally abandoned as inexpedient.—*N. Y. Tribune.*

CURIOUS ELECTRICAL PHENOMENON.

A party of surveyors belonging to the United States geological survey expedition of 1872, had a novel experience on the summit of a peak near Cinnabar mountain. When they were within five hundred feet of the top, a storm came up and they were enveloped in clouds. The ascent was very difficult, as the fragments of rock were sharp, and most of them loose, sliding from beneath the feet of the party as they clambered upward. One of the company, however, succeeded in reaching the highest point and depositing his instruments, when he discovered that he was in the midst of an electrical cloud, and his feelings not being of the most agreeable sort, he retreated. As he neared the remainder of the party, they observed that his hair was standing on end, as though he were on an electrical stool, and they could hear a series of snapping sounds, as if he were receiving the charges of a number of frictional electrical machines. Another member who attempted the ascent soon received a shock which deterred him. The peak was appropriately called Electric Peak. Its altitude, as measured the following day, is 10,992 feet above the sea.

THE INFLUENCE OF CLIMATE UPON LIFE.

An interesting article appears in the *Gazette Medical de L' Algerie* on the influence exerted by climates in regard to health and life of foreigners. In that article we are reminded that the negroes of Senaar recruited by Mehemet Ali for his army, speedily succumbed after arriving in Egypt; that negroes of Central Africa rapidly die if transported to Arabia, and that if sent to Europe they perish by phthisis. Of 1,800 negroes sent to garrison Gibraltar in 1817, nearly all are said to have been destroyed by pulmonary consumption in fifteen months, and of the negro convicts sent from the French colonies to the hulks at Brest, one-fifth die each year. In Mexico, the Egyptian contingent suffered by disease and death in larger proportion than did the regular troops from France; whereas Algerians and Arabs in France enjoy relatively better health than in their native countries. During the Russian war the Zouaves and Turcos resisted the climate of the Crimea better than the men of the French heavy cavalry, and, it is said, that on the same occasion the Algerian horses withstood the severe Winter even better than those of the English cavalry. With regard to the power of resistance of Arabs, as illustrated in the war of 1870–71, it is observed, that if in battle they become excited to paroxysms of fury, once wounded, or taken prisoners, they find in their complete belief in fatalism a source of moral calm and resignation. The Arab, moreover, is less sensitive to pain than the European; hence, in a great measure, the principal cause of the faculty with which wounds received by the former heal.—*The Doctor.*

THE cable of the Western and Brazilian Telegraph Co. from Perambuco to Para has been successfully laid, and the cable steamer Hooper will leave about Nov. 1 to submerge the sections of cable from Pernambuco to Bahia, and from Bahia to Rio Janiero.

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GREENWICH TIME.

Never had science a more pleasant retreat than Greenwich Observatory appears to be this bright summer morning.

For all its pleasant aspect, however, the idea of exploring it is decidedly a formidable one. At the very entrance gates one feels suddenly convicted of the most abject ignorance. Here are mysterious metal pins fixed on the wall for the determination of British measurements, and the question at once arises, What have these to do with astronomy? Then there is a great clock-dial on which the hours are reckoned from one to twenty-four, and which is popularly believed to be kept going by the sun.

Determined to clear the way as he goes on, the visitor makes these outer difficulties the subjects of his first inquiries on gaining admittance, and he discovers to his amazement that the very length of his trousers, and the cut of his coat, and the height of his hat have all been determined by measurements based upon the motions of the heavenly bodies.

A tailor's yard measure, it appears, bears a certain proportion to the length of a pendulum which, under specified conditions, beats accurate seconds of time, and seconds of time are determined by astronomical observation. If the tailor wishes to verify his measure he has only to bring it to the Observatory gate, where he will find a standard absolutely accurate.

As to the clock, it is an astronomer's clock, and astronomers know nothing of A. M.'s and P. M.'s; their calculations are sufficiently complicated without them. The notion that it is kept going by the sun is, it need hardly be said, a mere delusion.

On passing the outer portal of the Observatory, the visitor finds himself in an open courtyard, with an irregular pile of buildings on his left hand. Entering a low doorway in one of these, he is at once interested to discover that he is really at what may be considered the fountain-head of all our computations of time. The chief business of Greenwich, as all the world knows, is to tell us the time of day, and in this small and somewhat mean-looking apartment is the great telescope by which observations for this purpose are effected.

This instrument—the transit circle, as it is technically called—is twelve feet in length, and its largest glass is eight inches in diameter. It is suspended by the middle between two massive stone buttresses in such a manner as to permit of its sweeping the sky in a straight line overhead, though it cannot be veered round to the right or left.

We have arrived, let us suppose, a little before noon; the sun is about to cross the meridian, and an observation is to be made. Shutters in the roof are thrown open, the great telescope is swung up and fixed in position, and an observer seats himself at the lower end of it. While we are waiting for the great lumiuary, let us take a peep through the instrument. All that can be seen is a number of vertical lines—technically called wires, though they are in reality so many pieces of cobweb—stretched across the field of observation at irregular distances. The centre one is the celebrated meridian of Greenwich, or at all events it represents it, and it is curious to reflect that from this centre line ships of all civilized nations, and in all parts of the known world, are reckoning their distances; that this little piece of cobweb is, practically, all that divides the world into eastern and western hemispheres.

While we are peering along the telescope, the drowsy tinkling of innumerable clocks is heard through the still summer air, and we begin to think that for once at least the sun is behind time. If not, then it seems plain that all the Greenwich clocks are wrong, a supposition which is quite at variance with all our traditional ideas of the place. On inquiry, it is gratifying to find that our faith in Greenwich timepieces is perfectly justified, and that it really is the sun that is behind time. The apparent motion of the sun, as everybody knows, is really the motion of the earth. Now the earth moves round the sun in a kind of oval pathway. When she is on either side of this oval her motions are accelerated, and the sun will cross the meridian before he is due. Just now, however, we are at one end of the oval, and the earth moves slowly, and, as we see, the sun is behind his time. It is clear, therefore, that if the Greenwich clocks were to be regulated according to the time at which the lord of day puts in an appearance at this little cobweb, they would require constant alteration. They are, however, set to record the average time of his transit. This never varies, and twelve o'clock "Greenwich mean time" is simply the mean or average time at which throughout the year the sun crosses the meridian.

Let the observer now resume the watch at the instrument. What he has to do is to record the precise instant at which the sun's edge or "limb," as astronomers express it, passes that central "wire." In any single observation, however, he may be a little at fault, and for the sake of greater accuracy, therefore, he will note the instant at which it passes over all the "wires," and then strike an average between them.

Slowly the sun creeps up to the first line, and the observer lightly taps a little spring attached to the telescope. The second "wire" is reached, and again the spring is tapped, and so on throughout the whole of the seven or nine webs employed in the observation.

This spring is connected with a telegraphic wire extending to a "chronograph" in a distant part of the building; and in order to understand the method of recording the observation, we will now follow the telegraphic signal, or as imagination is even swifter than the telegraph, we will imagine that we have reached the "chronograph" first, and and are there ready to receive the signals.

Accordingly we find ourselves in a queer little chamber, in which the most prominent object is a very beautiful specimen of a clock whose pendulum, instead of oscillating backwards and forwards, swings round in a circle, thus producing a motion perfectly uniform and unbroken. This clock is revolving the "chronograph," which consists of a cylinder around which a sheet of white paper has been strained. While we are watching this revolving barrel, we see the observer's signals come. A little steel point, which is traveling over the surface of the paper, is in electric communication with the spring attached to the great telescope; and every time the observer taps the spring, this little traveling point pricks into the paper, thus recording that the sun has just crossed a "wire." This in itself, however, would not be a record of the time of transit if it were not that another little steel point, which is in connection with a galvanic clock in another part of the building, has previously marked the sheet of paper into spaces representing the precise seconds of time. On the completion of the observation the paper may be reserved from the cylinder and affords a permanent record of it.

Nothing perhaps throughout the Observatory at Greenwich is calculated to strike the visitor with greater astonishment than that galvanic clock to which reference has just been made. There is nothing very remarkable in its appearance, but the work it accomplishes renders it perhaps the most wonderful clock in the world, and certainly the most important one in England.

In the first place, as we have seen, it plays an important part in registering observations. Besides this, it regulates several clocks within the Observatory, as well as the large one already referred to outside the gates; one at Greenwich Hospital Schools, another at the London Bridge Station of the South Eastern Railway, another at the Post-office, St. Martin's-le-Grand, and another in Lombard Street. Once every day it telegraphs correct time to the great clock tower at Westminster; it drops the signal ball over the Observatory, another near Charing Cross and one at Deal; it fires time guns at Shields and Newcastle, and every hour throughout the day it flashes out correct time to each of the railway companies. All this is accomplished as it were by the mere volition of the clock, and without any human interference whatever. Every morning it is corrected by an actual observation of a star; and thus, without being aware of it, we start our trains, and make our appointments, and take our meals by the motions of the heavenly bodies as observed and recorded during the preceding night.

We now proceed to one of those curious little domes surmounting various parts of the Observatory. Here we find an instrument devoted entirely to the study of the moon. Observations of the moon are of immense importance to us as a nation of navigators, inasmuch as she affords the means of determining longtitude at sea. Her motions, however, from various causes, are of an extremely complicated nature, and it is very necessary that she shall be observed at all times, and under all circumstances. But with the transit circle, the instrument first noticed, it is plain that the moon could be observed only when she is crossing the meridian, and not always then. Some five or six-and-twenty years ago, therefore, Sir George Airy, the present Astronomer Royal, designed the "Altazimuth," and since then the importance of Greenwich as a lunar observatory has been just about doubled.

With this instrument and the transit circle the Observatory might do all that, strictly speaking, comes within its province. The whole duty of Greenwich, as defined by Herschel, is "to furnish now, and in all future time, the best and most perfect data by which the laws of the lunar and planetary movements, as developed by theory, can be compared with observation. Mensurative astronomy for practical purposes is the great business of Greenwich.—*Cassell's Magazine.*

WROUGHT IRON TELEGRAPH POSTS.

Telegraph posts and columns manufactured in Manchester are formed of spirals of iron—ribbons, in fact, supported on a cast iron base, and surmounted with a capital of the same material. A slender rod from the axis of the column, or, as it really is, a trellis work tube. Compared with cast iron columns these structures are little more than one-third either in weight or cost, while in appearance the gain is decidedly great. For conservatories or other horticultural purposes the trellis column is very suitable. Such a pillar, eleven feet high and eight inches in diameter, is guaranteed to support a vertical pressure of one ton.

ON September 10, the New Swedish-Danish-English telegraph line was opened to business, by which Sweden has been placed in direct telegraphic communication with Great Britain. At the same time a new line has been opened between Gothenburg and Fredericia, through which Sweden has been placed in direct connection with the Danish-French cable. Gothenburg is the termini of two new lines in Sweden, for which reason the Company have selected it as a cable station.

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NON-RESISTANCE OF THE EARTH AS A CONDUCTOR.

Steinheil, in 1837, was the first to employ the earth as a substitute in a telegraphic circuit for the return wire. He buried two copper plates in moist earth, one at each station, and connecting the extremities of his telegraphic lines to these plates, and found that signals could be transmitted with as much facility as when a return wire was used. In fact, as proved by Wheatstone, in 1841, the same battery will work to a far greater distance with a circuit half wire and half earth than when altogether wire. In 1844, Matteucci, by an experiment in which he caused the current from a single Bunsen cell to flow through a copper wire 9,281 feet in length, and through the same length of moist earth, found that the earth conducted so much better than the wire that its resistance must be regarded as nothing. Bréguet also found on the telegraph line between Paris and Rouen, that when the current traversed a circuit half metal and half earth, the intensity was twice as great as when the circuit was metallic throughout.

Two explanations have been given of this non-resistance of the earth: one, that as the conducting power increases in proportion to the area of a section of the conductor, the earth, acting as a conductor of infinite area, offers a smaller amount of resistance than the metallic part of the circuit; the other, that the earth acts as an immence reservoir which absorbs all the electricity poured into it.

THE British Government have purchased the lines of the telegraph companies at a cost of £5,847,347. The additional sum of £586,853 has been paid for the lines of 28 English and Welsh railways, besides contracting to pay various sums annually for rights of way or "way leave." Twelve Scotch companies have been recently contracted with for about £275,000. Forty-four railway companies still remain unsettled with, most of them involving large amounts. Mr. Scudamore's original estimate was £3,000,000. The *Railway News* remarks: "To the sums paid, and to be paid, must be added the cost of alterations and extensions necessary to concentrate the separate systems. When all these matters are settled, we shall not be suprised to find the aggregate cost represented by a capital sum of twelve millions sterling (equal to $65,000,000), or four times the amount of the original estimate."

FOUCAULT has invented an apparatus for measuring the velocity of light, which includes a small wheel that can be run at the rate of 60,000 revolutions a minute. The wheel carries a diminutive mirror, which at first was of the ordinary kind; but the great speed quickly stripped the amalgam from the glass, and a metallic mirror had to be substituted.

THE science of *Electricity* has met with the loss of one of the veterans in that department, Sir Francis Ronalds, whose death, in his eighty-sixth year, was recently announced. A work of great labor, including the history of the development of the science of electricity, is announced as having been completed by him shortly before his death, and will be looked for with great interest. He established, in 1823, a working electric telegraph through eight miles of wire.

THE influence of the electric current on germination and the growth of young plants, has been studied with much care and discrimination by Bridgmann, who finds that positive electricity promotes the upward growth of the roots, and leaves the seeds blackened and dried up, while, on the other hand, negative electricity promotes the downward growth of the roots, and maintains the seeds in a fresh and plump condition. Both positive and negative electricity, however, stimulate the growth of the young plant to a degree far surpassing its natural rate of development.

RELIGIOUS ELECTRICITY.

Recently, in New York City, at the dedication of the new and splendid Jewish synagogue, corner of Lexington avenue and 53d street, a portion of the first chapter of Genesis was sung by the choir; and as the words "Let there be light and there was light," were uttered with a grand burst of melody, the whole church was instantaneously lighted up by electricity. Thus it is that modern science lends her aid to give effect to the solemnities of her servants.

PROTECTION OF SHIPS' COMPASSES.

The possibility of protecting ships' compasses from the disturbing effects of the varying action of the iron on the vessel has led several eminent electricians to devise means to secure this result more or less perfectly, and the latest suggestion is that of Mr. Gloesvenor, member of the Royal Academy of Brussels, who proposes to place the standard compass on a prolongation of the bowsprit of the vessel, in this way securing the advantage of having all the disturbing iron on one side of the needle, and placed symmetrically with reference to it. The necessary length of the prolongation Gloesvenor finds by experiment to be twenty-five or thirty feet. To read the compass conveniently, he puts a mirror above it, in which a person standing on the deck may read the needle or compass card. A small fixed telescope facilitates the accurate observation.

BECQUEREL ON THE NATURE OF ELECTRICITY.

Becquerel, as the conclusion of long research on the electrical forces, says that "in the present state of our knowledge of physics and chemistry, it is scarcely possible to attribute to chemical affinities an electric rather than a calorific origin. What, then, is their origin? Time will answer. They are connected probably with universal ether. Let us study all the causes that exert an influence upon these affinities. This is the only way to effect the removal of the veil that covers this mystery."

THREE Telegraph companies, viz., "The River Platte and Brazil," "The Western and Brazilian," "The Montevedian and Brazilian," have united their interests, and have agreed to lay a cable along the coast of Brazil, touching at the following stations: Santos, Santa Caterina and Rio Grande. The Western and Brazilian Telegraph Co. had agreed to lay its cable from Rio de Janeiro to Bahia and Pernambuco, where it effected a junction with the cable to Europe of the Brazilian Submarine Telegraph Company, and thence proceeded to Para; while the Montevidian and Brazilian Tel. Co. had agreed to lay its cable from the frontier of Brazil to Maldonado, and thence to Montevideo. By this arrangement, these companies become a part of the Great European-Brazilian Telegraph system, with exclusive privileges of a character regarded as highly valuable. It is a union of the South American lines with England.

A DEVICE has been published by Sortais for detecting the occurrence of leakage in ships, an electrical arrangement being used, which is so constructed as to communicate to the captain, on a dial in the cabin, information of the slightest occurrence of anything of the kind, and the extent to which it has proceeded.

THE preliminary arrangements for the Black Sea cable from Odessa to Constantinople are completed.

THE Queensland House of Assembly has determined on the construction of a cable telegraph from New Zealand and New South Wales.

We regret to record the death of the amiable wife of Mr. George C. Wood, Manager W. U. Tel. Co., Fort Plain, N. Y.

A GOOD SUGGESTION.

To the Editor of the Journal of the Telegraph:

DEAR SIR: The piece in JOURNAL of September 15th, by J. H., in regard to advertising, seems to me to be a good idea, and in addition I would suggest a few plain rules for the public in regard to sending a telegram. There is a diffidence among many about using the telegraph on account of not knowing how to get about it, and what it is going to cost. I charged a wealthy farmer twenty-five cents for a message and he asked how that was, as he had received one which was marked "paid 9" and must have cost but 9 cents. I explained that it was probably marked "9, paid," which denoted the number of words and not the price. Let the calendar contain something like the following:

Write messages plainly, spelling words and numbers out in full.

Give full address, as address and signature cost nothing.

Ten words cost no more than a less number.

Be particular to write proper names very clear.

Very respectfully,

J. E. BROWN, *Operator.*

USE OF ARMATURES APPLIED TO MAGNETIC BUNDLES.—*M. Jamin.*—If several magnetized plates are superposed they react on each other, each destroying, in part, the magnetism of its neighbor; so that the portative force of the bundle is less than the sum of the forces of the plates considered separately. M. Jamin has found a means of preventing reaction and weakening for a time. He magnetizes each plate separately; applies to it a well-fitting contact of the same thickness, which neutralizes it; then superposes plates and contacts, fixing with screws the magnets together and the contacts together. This does not destroy the neutrality of the elements, but hinders their reaction. Thus to detach all the contacts a weight of 115 kilogrms. was necessary, or a little above the sum (108) of the individual forces. Immediately the contacts are detached the plates cease to be neutralized; their magnetism reappears; they react on and weaken each other as before. Superposed plates with an armature are less charged (magnetically), and so react less on each other. Armatures weaken the magnetic intensity; their par is to offer a space where magnetism may collect and be preserved, which would otherwise be destroyed in consequence of mutual reaction between the constituents of the bundle.

THE steamship Hibernia, of the British Maintenance and Construction Co., is reported taking in the cable of the Brazilian line from Madeira to St. Vincent. The Kangaroo is also loading the cable, for Jamaica and Colon, for the West India and Panama Co. The Africa sailed two weeks ago to complete the system of cables in the Levant by a line from Alexandria to Candia; from the latter island to Zante, and an additional one between the Greek Archipelago and Italy, thus giving another route to the East from Europe, and uniting Turkey in Asia with the great submarine telegraph system.

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ON THE MULTIPLE CAUSES THAT PROVOKE THE DISCHARGE OF LIGHTNING—*By M. W. de Fonvielle.*—Having rapidly enumerated the causes relating to the form, nature, and situation of the objects struck, M. Fonvielle seeks to show that two neighboring conductors react strongly one upon the other when they are under the influence of a storm-cloud. He seeks to establish that this reciprocal influence is not the same in the case where the two conducters are insulated, or when they are placed in connection with the common reservoir, either the one and the other, or the one or the other only. It is known that an electrified cloud acts by induction on all the objects which it covers, but, as M. Fonvielle believes, no one has yet remarked that by the fact of its movement the electrified cloud produces special reactions. According to him, it acts in the same manner as the revolving plate of a Holtz machine, which by its movement at a distance of an induced body, produces, as we know, an energetic disengagement of electricity. M. Fonvielle seeks to draw some practical conclusions from this assimilation, which appears to him to explain how it is that insulated conductors, placed to the south-west or north-east of considerable masses with a common reservoir, are more frequently struck. He hopes to arrive ultimately at experimental proof of all these theoretical deductions, by the aid of a special register for condensing lightning conductors, of which he has already had the honor of laying a notice before the Academy at the commencement of January last. M. Fonvielle enumerates certain phenomena, such as the rise of the sea, which seem to show that the attraction of the clouds is powerful enough to make itself perceived on the surface of the earth. It appears to him necessary to conclude from this, reciprocally, that the influence of the surface is sometimes powerful enough to modify the pace of the clouds, so as to impart to them in certain cases a greater velocity before they reach the zenith of the object influenced. Changing greatly their character, the attractions can, in other circumstances and particularly until there is no electric discharge, diminish the velocity of the clouds after they have passed the zenith of the electrified object. In short, these attractions and repulsions, of which we have too long neglected to take account, place themselves in juxtaposition to the movements produced by the primitive Newtonian attraction and repulsion as the displacement of the clouds are combined with the general action of the wind. M. Fonvielle concludes by remarking that the modifications stated in the value of the terrestrial magnetism, consequent upon the movement of the stars, are analogous to those which the clouds produce on the electrification of points of the earth's surface. In all the cases, the electric forces developed incontestably proceed from the transformation of dynamic efforts, be the motor the wind or any known or unknown cause of movement.

"JOHN" writes from Fort Dodge respecting a plan for separating the metals in the Hill Battery, instead of Mr. Haskins' plan of casting the supporting wire, which "John" says every one can't do. "John" proposes a crib made of small sticks, three being upright the length of the amount of separation needed, the others laid across to keep the uprights in their places. But "John" has no Hill battery, and doesn't know how his plan will work, and so we punish "John" for writing about what he has not proved, by withholding his communication. We have, however, given his plan to whoever may please to try it, but which we don't commend.

SHARES of the Globe Telegraph Co. are now in the lists of the London Stock Exchange.

A FAMOUS TELEGRAPH OPERATOR.

Among the victims of the fever at Shreveport was Alfred Saville, one of the best known and most accomplished telegraph operators in the country, and attached to the command of General John H. Morgan during the late war. Few have forgotton how, early in the game, he took possession of the wires between Nashville and a body of Federals operating in Southern Kentucky, giving peremptory orders not to send any more troops, but plenty of provisions and ammunition, and an old friend, then in charge in Nashville, detecting the peculiar touch or fingering of the bogus operator, flashed back to him this good-humored answer: "Get out, Saville, or I'll send the cavalry after you."

Saville volunteered his services at Shrevesport after every resident operator had been stricken down, and died at his post.

A TELEGRAPHIC SOCIAL UNION.

TRENTON, N. J., Oct. 16, 1873.

To the Editor of the Journal of the Telegraph:

DEAR SIR:—George W. Zeigler, operator on the Belvidere and Delaware Railroad, and son of the proprietor of the Union Hotel, Lambertville, N. J., gave an entertainment on Tuesday evening, October 14, to his associate operators of the Pennsylvania Railroad and to a number of invited guests. At 9.30 P. M. about fifty sat down to a bountiful repast. Mr. J. C. Hankinson, of Trenton, presided. A telegraph instrument stood beside him, from which a wire was connected, running up the Belvidere and Delaware Road, with which Mr. H. kept up commucation with operators on the line, under the eye of our genial superintendent, Robert Stewart. At the conclusion of the repast, speeches were made by A. C. Davis, J. E. Moon, R. B. Reading, J. C. Hankinson, C. P. Curtis, C. W. Wellington, and a host of others, after which a meeting was organized in the reception room, by the appointment of Robert Stewart, chairman, and James E. Moon, secretary. A committee, consisting of Jesse R. Mills, T. F. Skillman and R. R. Reading, reported the following resolutions, which were unanimously adopted:

Resolved, That the thanks of the operators of the Belvidere Division, Pennsylvania Railroad Co., and the invited guests, are due and are hereby tendered to George W. Zeigler for his handsome entertainment of this evening.

Resolved, That the pleasure we have received on this occasion is largely due to the ladies, for their kind and unremitting attention and graceful and kindly presence.

An hour or two was then spent in the enjoyment of vocal and instrumental music, contributed by H. Barber, E. Gallagher, W. W. Angel, C. H. Green, R. B. Reading, C. W. Wellington, C. A. Davis, J. M. Lewis, C. P. Curtis and W. W. Currier of Boston, all telegraphers, and in the small hours of the night the guests separated to their homes by special trains to Trenton and up the river. MILLS.

A COMMUNICATION signed "Amicus" desires the talent now employed in discussing changes of Alphabet to be used in advocacy of a new Tariff Book. This is scarcely a topic for discussion in the JOURNAL. The true plan is to communicate with the superintendent, one of whose duties it is to watch the necessities of the service and facilitate office labor. For us to discuss such subjects seems like unnecessary interference with executive duties.

NOTES AND QUERIES.

Suppose we should take in a message of twelve words at 50 and 3; total, 56c. Should we collect 55c. or 60c.?

Answer.—Collect 56c.

How many words in following message: "Shipped goods in car No. one hundred and thirty five (135)? Please answer through the JOURNAL.

Answer.—Fifteen words.

For the instruction of others, please say whether or not to do as follows is correct An office on this road receives a red message some time on the morning of Saturday, and did not start it until after six o'clock on the following Monday morning.

Answer.—The message should have been sent the same evening. It may, however, have been stipulated in the case presented that delivery on Monday morning would be satisfactory. If not, it should have been sent the same evening and delivered next morning.

Does Rule 245 include messages that are received for transmission?

Answer.—We know of no rule 245.

IN absence of manager to dinner, a boy leaves a message for transmission, signed by unknown parties. Manager sends message ten minutes afterwards, collect. Parties addressed refuse to pay. Says it is too late to be of any use. Receiving office sends back to collect at originating office. Must manager pay for such message when sender cannot be found, or should manager not send such message? Please answer through JOURNAL. MC.

Answer.—The message should not have been sent. It was also against the rules to send such a message collect.

PLEASE say in next JOURNAL if, in computing tariff on Reds where regular rate ends with the unit 5, if we make it 6 and divide, or add 5 and make it 0 and divide? For instance, full rate, 1.25, is 63 or 65 the half rate where there are ten words or less?

MANAGER.

Answer.—63.

MARRIED.

BURROWS—REICHELDERFER.—October 15th, 1873, at the residence of the bride's parents, Lima, Ohio, Thomas W. Burrows, train despatcher C. C. C. & I. Railway, Cleveland, O., and Miss Clara E., eldest daughter of Levi Reichelderfer, Esq.

HATCH—CHANDLER.—At Gloucester, Mass., Oct. 11th, 1873, by Rev. Minot G. Gage, E. F. Hatch, manager W. U. Telegraph office, Gloucester, Mass., to Miss Lydia N. Chandler of Boston.

FIGHER—GUYMON.—At the residence of the bride's parents, at Greenfield, Ind., on the 24th of Sept., Mr. William Figher, operator W. U. office New Albany, Ind., to Miss Pet Guymon, of Greenfield, Ind.

DIED.

FARRELL.—In Virginia, Nevada, October 14th, Clarence Albert, infant son of James F. Farrell of W. U. Tel.

WOOD.—In Fort Plain, N. Y., of typhoid fever, on Thursday, Oct. 2, Gezena W., wife of George C. Wood, manager W. U. Telegraph office, aged 29 years, 2 months and 14 days.

BORN.

BUSH.—At Franklin, La., Oct. 13th, 1873, to W. T. Bush, manager W. U. Telegraph office, a son.

CAMPBELL.—At Farmington, West Va., Oct. 1st, 1873, to W. W. Campbell, a son.

RUNYAN.—To C. A. Runyan, manager W. U. Telgraph office at Canandaigua, N. Y., a son.

STRAUS.—At St. Helena, Cal., Oct. 10, to Eugene A. Straus, Manager W. U. Tel. Co., a son.

YOUNG.—At St. Louis, Mo., Oct. 18th, to W. A. Young, chief operator, Gen. Supt. office of St. L., K. C. & U. R. W. Co., a daughter.

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THE GALVANOMETER AND ITS USES.

New York: D. Van Nostrand.

A handsome and convenient manual for electricians and students bearing the above title has just been published by D. Van Nostrand, 23 Murray St., New York. C. H. Haskins, the author, is well known as an experienced telegraph superintendent.

A thoroughly practical book by a thoroughly practical man, is always a welcome addition to the literature of any art or profession. More especially is it so when it comes in such a tasteful and handy form as the book before us. Mr. Haskins is unusually well qualified for the task he has undertaken, and he has performed his work in a manner which will earn him the hearty thanks of every working electrician.

The book is divided into three parts. The first is chiefly of an explanatory character, treating of the laws which govern the action of the electric current and their application to the operation of the telegraph and other cognate matters. The second part is devoted entirely to a description of the different galvanometers and other arrangements for electrical measurement, and an explanation of their use; while the third part comprises a large number of methods and formulæ for all kinds of tests and measurements, together with a large number of useful tables.

We find much to commend in the method in which Mr. Haskins has performed the difficult task of explaining the fundamental principles of electrical science in a manner to be understood without difficulty by the average telegraph operator. For example, we have never seen so clear a definition of electromotive force as he has given on page 8. He says: "The power which a cell of battery possesses of causing the transfer of its current from one place to another is its *electromotive force*. In other words, the electromotive force of a current is its power of overcoming resistance—its energy. To use a familiar comparison, electromotive force is to a current what pressure is to steam." If space permitted, we would be glad to quote other equally apt explanations of technical terms, some of which have long been a stumbling block to the student. In the second part both the Bradley and Gaugain tangent galvanometer are described, with instructions for their use. The portion relating to this useful instrument might with advantage have been made more full and comprehensive. The tangent galvanometer, as an instrument of measurement in ordinary telegraph work, is rapidly growing in favor, and it will, we think, in future be almost the only instrument used for this purpose. During the time a single wire is being tested by the differential method, an expert operator will go over a dozen wires with a tangent instrument, register the deflections, and then work them out, if necessary, at leisure. In a large office where the wires are needed every minute this is a matter of great importance. Of course, the more accurate instruments and methods come in play oftentimes in locating a cross or ground, but even in such cases nearly as good work may be done with the tangent in many cases. Clark's beautiful method of taking the internal resistance of a battery by a differential tangent instrument ought to have found a place in Mr. Haskin's book. Nearly all the methods given in the standard works on telegraphy have been brought together, and we notice several new and useful ones by Sargent, Pope, the author, and others, which add greatly to the value of the work. In fact, with this pocket companion the electrical engineer is armed and equipped to meet almost any question likely to arise in the ordinary course of his work.

Critics are nothing if not critical, therefore we shall take the liberty to point out one or two places where there is room for some little improvement. On page 7 we read that "the resistance of any iron wire per mile is found by dividing 360,000 by the square of its diameter. The quotient will be in ohms at 60 deg. Fahrenheit." As there is not the remotest hint in what terms the said diameter is to be expressed, the directions are calculated to muddle the mind of an unsuspecting youth. He might figure out that the resistance of a wire, two inches in diameter, was 90,000 ohms per mile, which may account for that astounding assertion, in a recent issue of a contemporary, in reference to "wires of all diameters, from one to two hundred miles, which electricians will find very convenient for many purposes." It will be observed that 360,000, divided by the square of 200 miles, would give 9 ohms per mile—certainly a "very convenient" wire—and thus he seems to have been led into error. If, however, the reader will turn to page 46, he will find a more rational explanation, and learn that the diameter is to be taken in thousandths of an inch or *mils* (not miles). In the directions for taking the internal resistance of a battery, on page 34, it should have been stated that the readings are to be reduced to sines or tangents, as the case may be, when the deflection exceeds 15°.

We cannot close our notice of this book without saying a good word for the publisher. Everything that clear types, good presswork and paper and excellent binding can do to add to the attractiveness of the work has been done. With a few blank leaves for memoranda and manuscript formulæ—every electrician has one or two pet ones of his own—a pocket for loose papers and a place to stick a pencil, all of which Mr. Van Nostrand will no doubt add as soon as he reads this notice, there would be very little to ask for in the way of a telegraphic engineer's pocketbook, that this work would not supply.

The cable steamer Robert Lowe arrived at Halifax, N. S., from Cape Formentine, having successfully laid the new cable between Prince Edward Island and the mainland on the 11th. The shore end was landed at Cape Traverse on the 8th, and the paying out was commenced next morning. The steamer reached Cape Formentine the same evening, but in consequence of rough weather was unable to land until the 11th.

The cable steamer Robert Lowe, October 21st, commenced at Halifax, N. S., taking on board a new cable, to be laid between Cape Breton and Newfoundland.

In carrying out plans for giving storm warnings to sea-going vessels, the Signal Office has found it necessary to make telegraphic connections with various life-saving stations along the Atlantic coast, and is building lines for that purpose. From the station at Peck's Beach, N. J., a line 10 miles long has been built to Seaville, where it connects with the Western Union. A construction party is now engaged on a line from Sandy Hook, which is to extend 50 miles southward to Squan and Barnegat. A line from Rockport, Mass., to Cape Ann, two miles long, and another from Norfolk to Cape Hatteras, 137 miles, is soon to be built. The telegraphing at these new stations will be done by soldiers instructed in telegraphy at Fort Whipple. The Signal Office has adopted the new Kenosha insulators.

J. T. Webber says, "Stop my paper; I get one from my supt." Now, Mr. Webber, where is thine abode? otherwise, where hangest thou out thy shingle? that is, where do you live? Please read our article on the "toil of carelessness."

THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY,

August, 1873.

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B. De Klyn	Long Branch	Cotton Exchange.
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TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKOWLEDGEMENT OF RECEIPTS FOR ASSESSMENTS NOS. 47 AND 48, UP TO OCTOBER 28.

5, 19. 51, 58, 78, 84, 136, 139, 154, 156, 158, 160, 164, 176, 177, 182, 201, 202, 206, 252, 261, 316, 323, 328, 330, 341, 371, 376, 428, 429, 466, 468, 469, 470, 471, 474, 475, 490, 495, 496, 497, 499, 500, 503, 504, 505, 507, 508, 514, 560, 561, 565, 605, 652, 671, 690, 712, 723, 724, 728, 780, 800, 823, 851, 897, 904, 934, 954, 956, 957, 959, 960, 963, 964, 977, 979, 1004, 1028, 1057, 1072, 1099, 1103, 1105, 1106, 1107, 1108, 1109, 1110, 1112, 1113, 1115, 1117, 1119, 1120, 1121, 1122, 1123, 1130, 1131, 1139, 1182, 1193, 1194, 1211, 1221, 1234, 1235, 1251, 1268, 1269, 1289, 1295, 1388, 1414, 1449, 1502, 1528, 1529, 1530, 1565, 1573, 1585, 1597, 1598, 1599, 1600, 1601, 1603, 1604, 1605, 1606, 1607, 1608, 1619, 1620, 1638, 1639, 1640, 1641, 1642, 1643, 1647, 1653, 1654, 1655, 1657, 1667, 1672, 1680, 1689, 1690, 1691, 1692, 1696, 1699, 1712, 1732, 1743, 1750, 1751, 1752, 1753, 1754, 1755, 1756, 1757, 1758, 1761, 1765, 1766, 1767, 1768, 1769, 1771, 1772, 1788, 1789, 1790, 1798, 1799, 1822, 1830, 1832, 1833, 1834, 1835, 1836, 1856, 1860, 1895, 1896, 1897, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1933, 1934, 1969, 1977, 1978, 1979, 1980, 1981, 1989, 2015, 2047, 2101.

ASSESSMENT NO. 49.

64, 277, 380, 509, 516, 553, 662, 870, 912, 917, 1024, 1154, 1267, 1329, 1629, 1813, 1818, 2020, 2082.

ASSESSMENT NO. 50.

8, 131, 289, 301, 302, 323, 371, 627, 742, 858, 859, 1874, 923, 932, 1489, 1516, 1862, 2017, 2026, 2097, 2119.

ASSESSMENT NO. 51.

286, 626, 722, 1178, 1531, 1550, 1648.

ASSESSMENTS 49, 50, 51, 52.

15, 21, 46, 59, 64, 67, 76, 77, 86, 91, 113, 133, 140, 145, 157, 179, 208, 211, 245, 301, 342, 349, 352, 367, 380, 383, 385, 464, 510, 546, 567, 564, 615, 656, 685, 715, 721, 741, 742, 776, 797, 821, 886, 915, 916, 917, 923, 952, 1039, 1056, 1088, 1090, 1126, 1147, 1148, 1175, 1183, 1199, 1232, 1245, 1252, 1300, 1306, 1336, 1356, 1357, 1371, 1394, 1398, 1429, 1489, 1550, 1552, 1568, 1571, 1589, 1590, 1658, 1678, 1680, 1695, 1697, 1698, 1705, 1735, 1809, 1881, 1894, 1907, 1919, 1944, 1950, 1970, 2021, 2029, 2030, 2043, 2049, 2057, 2069, 2073, 2086, 2097, 2100, 2103, 2114, 2120, 2121, 2126, 2133, 2138.

The annual meeting of the Association will be held at 145 Broadway, New York, at 7:30 P. M., November 5. Two of the agents have signified their intention to be present, and others are expected.

It is felt that this meeting is of unusual importance, and it is exceedingly desirable that members at a distance should have a voice in its proceedings. We have received and disbursed about $20,000 during the past year, giving our organ zation a claim upon the body of the telegraghers throughout the country which is worthy of their consideration. The New York members have hitherto turned out in force at the annual meetings, and we hope members from a distance will also feel the duty of their being represented this time.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, NOVEMBER 1, 1873.

BREACH OF TRUST.

It is now twenty-eight years since the telegraph commenced its mission in America. During all that time scarcely a charge can be sustained of its infidelity to the hundreds of thousands who have used it. The character of its work so appeals to honor, and so impresses with the idea of a sacred trust that telegraph operators all through the land have been faithful. This has sometimes been carried so far that an operator has been known to burn a message rather than expose it, even in a court of justice. This prevalent fidelity has been remarkable. There is a deep philosophy in it. It proves that to make men faithful they must be trusted. The exceptions only prove its truth. The public has trusted the telegraph, and its confidence has been honored. It has made a typal character. The average American operator will never divulge a secret committed to him. His very business educates him in honor.

It is therefore with much pain that we have to record the summary dismissal of A. C. Barker and W. D. Linton, of Omaha, for delivering a copy of an important political message, and a reply thereto, into the hands of Mr. E. Rosewater, Editor of the *Omaha Bee*. We give the facts below. We wish as summary a punishment could be meted out to the Editor who accepted, and, perhaps, paid for the stealing of the intercepted despatches. It is not the first time the game of bribery of telegraph men has been tried The editorial chairs have many blacklegs in them, who have prices for violated honor always ready. This Rosewater may be one of them. He bears on his stern post the marks of discharge from a business for which he was unfit.

CHICAGO, Oct. 14th, 1873.

Hon. WM. ORTON, President.

Dear Sir: This morning's *Tribune* in this city had the following "special" from Omaha:

AN ATTEMPT TO INFLUENCE THE VOTES OF WORKMEN ON THE UNION PACIFIC RAILROAD.

Special Dispatch to the Chicago Tribune.

OMAHA, Oct. 13.—A confidential dispatch was sent this forenoon, from this city to Denver, by the Western Union Telegraph, from Hon. O. I. Poppleton, attorney of the Union Pacific, to S. H. H. Clarke, Assistant-Superintendent, in which Mr. Poppleton asks Mr. Clarke for his influence on the men in the railroad shops to elect Henry Greece, the People's candidate for Sheriff. An evening paper has published the dispatch. How it obtained it is a mystery. There is great excitement over the election.

After reading it, I telegraphed Manager Lehmer, asking particulars.

I enclose copy of his reply, and my instructions. Rosewater, Editor of the *Omaha Bee*, was, for many years, in the employ of our Company, and was discharged from our Omaha office. He is capable of doing very mean things, and I should not be surprised if he bribed the two operators to give him information of matter passing through our office.

Respectfully yours,

ANSON STAGER,
General Superintendent.

MANAGER LEHMER'S REPORT.

OMAHA, Nebraska, Oct. 14th, 1873.

Yesterday a dispatch was handed in to us from Hon. O. I. Poppleton to Clark & Kimball, at Denver, of great political import to the people here. About three or four o'clock the person who handed it in came to me and said some one had made it public, and accused the employés of this office of having done so. Not knowing anything to warrant the accusations, I declined to believe it, but took immediate steps to ferret it out. From an affidavit made by E. Rosewater, Editor of the *Omaha Bee*, and published in the morning *Republican*, I was convinced it was sent out by some one connected with this office, as also a reply to the message. I called the employés together, and asked the man or men implicated to step out. An operator, named A. C. Barker, acknowledged that he was responsible for it. I discharged him, of course. I then asked him to make an affidavit, which would settle the matter. He did so. He says that he did take the message from this office to the office of the *Omaha Bee*, and gave the same to Mr. E. Rosewater, Editor of said paper. He further says, that he took said dispatch and delivered it to said Rosewater on his own responsibility, and without the knowledge of Frank Lehmer, manager of said company, or of any other official of said company. I asked him if he couldn't say without the knowledge of any one else. He said he couldn't do that, as others were implicated. I came back to the office, and operator W. D. Linton came to me, said he could not see Barker go alone, and that he was implicated also. After his discharge I got him to make the following affidavit, which is in proper form and acknowledged. "That affiant knew at the time the telegram signed by A. J. Poppleton, and addressed to S. H. H. Clark and T. L. Kimball, at Denver, was received, that A. C. Barker purposed to take said telegram, and to show the same to E. Rosewater, Editor of *Omaha Daily Bee*; that affiant was cognizant of all that was done touching said telegram, as shown by the affidavit made this day by said Barker in his behalf; and further says, that no other person or persons connected with said company, in their office at Omaha, as an officer or employé of said company, knew anything about the said matter, except affiant and the said Barker." Now the answer to this message also got out. I staid here till eleven thirty last night, to watch out for any further disclosures, but saw none. The *Republican*, however, did have the answer, and say they got it from Rosewater. I got Linton to make affidavit, willingly, in fact he offered to do it, that on last night, about twelve o'clock, he gained possession of the "press" copy of the answer, and with Barker delivered it to certain parties whom he declined to make known, and this was done without the knowledge of any one but those two. Rosewater told me, this morning, that he would publish an article of exoneration, so far as myself and others were concerned, but would not tell me who gave him the message. These men I have had every confidence in, and am perfectly astonished at their action. They are willing to do more than this to clear the company and its employés, if desired. I have been to see Mr. Poppleton, who is most seriously affected by this, and he has destroyed his complaint he had intended to send East, and will take no action in the matter. I respectfully ask instructions. Our friends say we should publish these affidavits, and a statement to the effect that the men were held in high esteem and confidence; that they have been discharged, and cannot be allowed ever to work for the W. U. Telegraph Company again.

F. LEHMER.

To this Gen. Stager sent the following reply:

Frank Lehmer, Manager, Omaha:

Consult able lawyer at once, and if there is any punishment under laws of Nebraska for divulging contents of telegraph messages, prosecute these parties to full extent of law. If Rosewater is implicated, follow him as well. Follow advice of counsel as to publication. Advise me of result of interview with lawyer.

ANSON STAGER.

MR. LEHMER'S REPLY.

OMAHA, 14th.

A. Stager, Gen'l Supt.:

Consulted with Hon. J. M. Woolworth. A careful examination shows no statute whatever bearing on the case, and advises publication of the affidavits and the following card: Answer quick if there are any changes recommended.

OFFICE OF THE WESTERN UNION TELEGRAPH COMPANY,
OMAHA, October 14th.

To the Public:

The publication, in newspapers, in this city, of private dispatches sent over the wires of this Company, entitle the public to a full explanation. The most emphatic and explicit orders are given to every employé to treat as most sacredly confidential, every message committed to us. Every effort is made by all persons in charge of the business to secure the utmost secrecy in connection with it. The young men, whose affidavits are published herewith, have been in the employ of this Company for several years. They have never been guilty of such offence before, and have been always considered worthy of the fullest confidence. I had not the slightest reason to suppose they were not perfectly trustworthy in the line of their profession. Under the direction of Mr. Stager, the General Superintendent, I have consulted counsel to learn if our laws provides any punishment for this offence, and am advised that they do not. If they did, these young men should be punished to the fullest extent of the law, in order to vindicate the rights of the public and of this Company. They have been discharged from our service, and can never obtain, anywhere, any employment from this Company, and no other telegraph company will dare to trust them as its employés. This is all the punishment which can be inflicted on them. It destroys their occupation, and is, perhaps, enough. This action has been summary as it is severe. It may prevent others from committing the same offence, if anything were necessary. We assure the public that the utmost vigilance will be practiced by all employés of this Company to secure to all persons entrusting it with messages, that sacred confidence to which they are entitled, and we believe no similar violation of it hereafter need be feared.

FRANK LEHMER.

Frank Lehmer:

Your card is approved. I suggest you add the following: "This case is remarkable, as being the only instance known to the Company where operators have betrayed its confidence."

ANSON STAGER.

We trust to be long spared from a similar record. It is the first we have ever made. Let added care be taken to protect the business from a like dishonor. Every man's reputation is involved in it. Let it be known that telegraph men can be bought, and the whole system is shadowed, and the name of operator tainted with shame. Yet all will feel, as they read the prompt and frank acknowledgment of the men who have thus erred, a wish that some road to restoration was open. We share in this. We believe in the forgiveness of sins. Here, however, we acknowledge that dismissal must, and ought to be perpetual. The offence is too fundamental. All rose water is out of place in such a case. We wish, with a fervor which our boots approve, that ROSEWATER could feel the universal kick which ten thousand toes stiffen to accord him as they read this article.

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THE TOIL OF CARELESSNESS.

We believe there is a vast amount of useless sweat in this sweating world of ours. Men sweat over their mistakes instead of rectifying them, sweat over fancied injuries instead of braving them, sweat over sorrows which never come, and impose their sweat on others by barking at them their many-tongued complaints in rhetoric as irritating as incomprehensible. That there is a vast amount of anxiety and distrust caused by telegraphic correspondence there can be no doubt. In the very nature of things this must be so. Questions are asked which cannot be answered. Parties are addressed who are absent. Orders are given which cannot be filled. Messages are sent to homes where they simply create alarm or curiosity and bring no response. Many find eternal rest in some subordinate's pocket. The sweat and anger over telegraphic correspondence is no doubt fearful. Especially is this so when, to cram a message into ten words, the sense is so obscure as to make reply hazardous, or so carelessly written as to invite error. We honestly believe that half the fume and fret of this life is the result of want of care and particularity in performing daily duties.

Here is, for example, a man who sends to the Chief Executive officer of the Western Union Telegraph Company a complaint of overcharge on a message sent from Adrian to Ontario. His letter is dated Adrian. Whether his Adrian is in Michigan or New York or Illinois, or his Ontario in Canada or Ohio or New York, nobody knows. Yet carelessness in omitting full date imposes a useless complaint on a burdened officer, who will be sworn at because he does not and cannot reply, causes a half dozen computations in endeavoring to track out the wrong, and imposes upon us by being finally hung on our hooks to shoot at. No man should ever write a note to his friend without a clear date. Nothing should be taken for granted which can be easily and clearly expressed. For this want of exactness in work and in thought, in the composition of messages and in their address, in the statement of wants and the performance of labor, a vast amount of toil is added to the burdens of this toiling earth. How many thousands of messages it causes to pass unpaid for over those burdened wires we dare not estimate.

The JOURNAL has now assumed proportions which, as was well remarked by an English Journal not long ago, renders its cost utterly inadequate and ridiculous. With the opening volume, which will commence with the issue of January 1, 1874, the value of the JOURNAL will be still more enhanced. It will be printed on fine calendered paper, so as to give clearness of impression to its illustrations, and general beauty to its typography. Its matter will be more carefully select and yet varied. The odor of the shop will be less strong. The hand will not be always on the key. Yet the JOURNAL will be not the less true to its mission, truer to it perhaps than ever before. The terms will probably be changed from one to two dollars per annum. Until these terms are decided, subscriptions beyond the close of the present volume, December 15, will be declined.

H. M. BRICKETT, of Lowell, Mass., has sent us two dollars in answer to our invitation for aid to the Insurance Association by non-members. There are 4,999 more to hear from.

AT a special meeting of the Board of Directors of the Gold and Stock Telegraph Company, held at the office of the company in this city, on Monday, Oct. 27, Geo. B. Prescott was elected Vice-President.

THE London *Money Market Review* says: "The immense value of certain and instantaneous communication between this country and America has been illustrated by the crisis which has taken place in the United States. No sooner is the need for gold manifested in New York, than advices of its shipment from England reach that city, and the intensity of the panic becomes mitigated. It is also quite impossible to over-rate the advantage which European merchants have received in having uninterrupted and hourly intelligence of the facts which have occurred during these critical times."

When a great commercial panic occurs, and hundreds of excited men are seen flocking to the telegraph offices of the country with despatches for transmission, men say, "These are good times for the telegraph company." We have heard intelligent men claiming this as a feature which enhances the value of the telegraph in comparison with other property. It is a delusion. It is a mere temporary enlargement of its business, to be followed by the quiescence which succeeds all such excitements. Panics are as unfavorable to telegraphs as to all other pursuits. The healthier and more regular the condition of general commerce, so more healthily is the business of the telegraph enlarged. The excitement of the panic week leaves to-day many a wire partially employed.

The London *Railway News* thus speaks of the late George Saward, Secretary of the Atlantic Telegraph Company, whose death occurred at his residence in Camberwell, England, September 28th: "It is impossible, in speaking of the private character of Mr. Saward and of his public services, to refrain from the language of panegyric—they are not to be spoken of but with admiration and praise. His intimate friends have to mourn the loss of one whose refined and cultured tastes, whose polished manners, and whose unswerving integrity caused him to be admired and respected by all those with whom he was brought into contact, whether in business or in social intercourse." His message announcing the completion of telegraphic intercourse between Europe and America, the first prospectus of the Atlantic Cable Company having been prepared by him and much of its capital raised by his personal influence, shows the man: "August 17, 1858. Europe and America are united by telegraph! Glory to God in the highest, and on earth peace, good will towards men."

It would appear that although Mr. Saward was largely instrumental in the success of the Atlantic telegraph, he shared to a very limited extent in its substantial honors or rewards.

(*For Tariff Circular see page* 362.)

LETTER FROM MR. ORTON

MISSTATEMENTS CORRECTED.

NEW YORK. Oct. 23, 1873.

TO THE EDITOR OF THE HERALD:—

The editorial of the *Herald* of Sunday, October 19, headed "The Postal Telegraph," &c., contains certain erroneous statements, and is otherwise liable to convey erroneous impressions concerning the business of the Western Union Telegraph Company, which I ask permission to correct:—

First.—The average charge per message was sixty-one cents, as stated in the annual report, and not sixty-four and a half cents, as given by the *Herald*. The explanation of the apparent discrepancy is found in the fact that the gross receipts of the Company include moneys derived from other sources than from tolls on messages.

Second.—The statement that "the working expenses of the European lines, owned and operated by the government, average only forty per cent. of the gross receipts," is still more erroneous. The telegraph is operated at a loss by nearly every government in Europe, and the aggregate loss is several millions per annum, which is paid by taxation. In no case are the expenses less than eighty per cent. of the receipts. The average cost per message in Europe to the governments which carry on the business is greater than the average charge of the companies doing the business in the United States.

Third.—The statement that "it is admitted that the lines owned by the Western Union could be duplicated with the best English wire, the best instruments now in use, and the best poles, for $12,000,000," is erroneous, so far as the admission of any competent authority is concerned. Such a statement would be grossly inaccurate by whomsoever made. The annual report to which reference is made by the *Herald*, shows the acquisition of new property by the Western Union Company during the last seven years which cost over $13,000,000. The Western Union Company now own considerably more telegraph property than that for which the British Government has already paid over $40,000,000, gold, and an estimate of Sir Frank Ives Scudamore, now before me, states the probable cost of their telegraph property on the 31st of March, 1875, at more than $50,000,000, gold. They will not then have as great an extent of poles and wires as the Western Union now own.

Fourth.—"The stock of the Western Union is" not "watered up to three and a half times the real value of the plant." It did contain some "water," but I have already shown that over $13,000,000 has been squeezed out in seven years, and when you recall the fact that thousands of miles of line have been acquired at a small fraction of the cost to the original owners, and that millions have been contributed by railway companies to secure connection and the extension of lines upon their roads, it will be seen that the present capital of the company is not greatly in excess of, if it exceeds at all, the sum which was originally expended to produce the property.

Fifth.—The Western Union has paid no dividends in several years. What difference does it make, then, whether its lines cost $10,000,000 or $40,000,000, so far as the cost of sending messages is concerned. "One-half the present rates" would not pay the cost for operators, messengers, stationery and battery, to say nothing of maintenance, rents and interest on capital.

Sixth.—The increase of sixteen per cent. in the number of messages in 1873 over 1872 is erroneously attributed to reductions of the tariff. The only re-

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duction made was "the abrogation of all rates over $2 50," and this did not take effect till February 1, 1873, and was, therefore, in force but five months of the year, which ended June 30, 1873. The other and greater reduction referred to went into effect July 1, 1873, the beginning of the present fiscal year

Seventh.—The new "square rates" are, with but few exceptions, the same as the former "special rates" established upon competing routes. The exceptions are the rates between Boston and Washington and intermediate stations. The new rates are uniform for like distances in the Eastern, Middle, Southern and Western States.

Eighth.—The *Herald* is, probably, correct in assuming that further reductions will not be made by the companies now doing the business for some time to come. The average message rate in the United States since July 1 is but fifty-five cents, which is five to six cents below the average in Europe, where the cost of telegraph material and the wages of operators are thirty to fifty per cent. less than here. More than a year ago France increased her rates twenty per cent. on one class of messages and forty per cent. on another, the latter increase being on rates which yielded over sixty per cent. of her telegraphic receipts; and yet the increase in the number of messages during the year succeeding this increase of rates was greater than during any one of several preceding years. It will not be claimed that the increase of rates caused the increase in messages, but this fact does appear—viz., that the natural growth of the business was not sensibly retarded by a considerable increase of rates.

Ninth.—The phrase "the best English wire, the best instruments, and the best poles," is liable to be construed to mean that the poles, wire and instruments of the European lines are superior in quality and working capacity to those of the Western Union. Such a construction would not accord with the facts. A very large majority of the poles used in the United States are superior to those in use in Europe. As to wire, the Western Union have been using of the "best English" 10,000 miles per annum for several years past. It is proper to say, however, that wire is now made by several parties in the United States of a quality equal to the best English, and the reasons why we use the latter at all are—(1) it is not always possible to procure domestic wire in sufficient quantities to supply our wants, and (2) we are generally able to buy English wire a little cheaper than American, notwithstanding the duty of about sixty per cent. ad-valorem. As regards instruments, those of American manufacture are superior in efficiency to the more cumbersome and more expensive apparatus used abroad. Another fact is worthy of mention in this connection. American operators using American instruments perform much more telegraphic work in the same time on the lines in the United States than is performed by the same number of operators in Europe. The telegraph office in London employs more than three times as many clerks and operators as are employed by the Western Union Company in New York to handle about the same number of messages daily.

The relations of the telegraph to the public are so important, and with the press are so intimate, as to justify the expectation that the press will not give currency to erroneous statements concerning the telegraph which may prejudice the latter in the public mind. The facts hereinbefore stated do not rest merely upon my assertion. They are completely established by the official reports of the governments by which the business is carried on abroad and of the companies conducting it in the United States, and to deny them in the face of the evidence which is now accessible would seem to imply an indisposition to do justice to the American telegraphic system, which cannot actuate the conductors of so successful a specimen of American enterprise as the *New York Herald*. Very respectfully,

WILLIAM ORTON.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 BROADWAY, NEW YORK,
NOVEMBER 1, 1873.

To all Offices on W. U. Lines:

GENERAL INFORMATION.

The following changes and additions have been made since the date of the last Circular:

The attention of offices recently taken from "SPECIAL SHEET A" by the notices in JOURNALS dated September 1st and 15th, and October 1st and 15th, is called to the following notices:

When computing tariff on messages to Hastings Lake City, Minneapolis, Red Wing, St. Anthony St. Paul, Stillwater, Wabasha and Winona, Minn. and La Crosse and Prescott, Wis., offices of the N. W. Tel. Co. take the rates printed in the tariff book as "Tariff for other lines" instead of 55 and 4, as heretofore.

When computing tariff to points whose rates are made by adding to any of the above-named offices, as, for example, the points in Minnesota, given in JOURNAL of April 1st, 1873, add to the printed rate to such office, instead of adding to 55 and 4.

Offices in the West, having "*Sheet C*," will charge to offices of the N. W. Tel. Co., as that sheet directs.

Half-rate messages will still be taken for and received from the offices of the N. W. Tel. Co., named above.

St. Marks, Fla., re-opened.
Acworth, Ga., closed.
Mansfield, Ill., closed.
Postville, Iowa, is now a W. U. office, square 366; check direct.
Cummins, Ks., closed.
Chanute, Ks., changed to New Chicago.
Riga, Mich., re-opened.
Business for Morenci, Mich., may be sent via Detroit, Mich.; "tariff for Other Lines" same as via Toledo, 25 and 2
Austin, Minn., is now a W. U. office, square 406; check direct.
Sardis, Miss., re-opened.
Messages for West Wareham, Mass., should be sent and checked to Tremont, Mass. They are one and the same place.
Business for Fayette, Fulton Co., O., may be sent via Detroit, Mich.; "tariff for Other Lines" 25 and 2, same as via Toledo, O.
Liverpool, Pa., closed.
The tariff to Paxton House, Pa., is 10 cents more than the rate to Oil City, Pa.; check Oil City. (See "Exceptions" in last JOURNAL.)
Birdsboro, Pa., re-opened, square 59.
Antwerp City, Pa., closed.
The P. O. A. of Everson, Pa., is Fountain Mills, Fayette Co., Pa.
Bay Verte, P. E. I., closed.
Woodburn, O., closed.
Calvert, Texas, re-opened.
Englewood, Texas, closed.
Hallville, " re-opened.
Palmer, " closed.
Healing Springs, Va., closed.
Warm Springs, Va., closed.

NEW OFFICES.

305 Perdido, Ala.
371 O'Kane, Ark.
La Bran., Col.; tariff 50 cents more than Pueblo, Col.
257 Palmetto, Ga.
308 Crescent City, Ill.
347 Edwards, Ill.
288 Globe Station, Ill.
329 New Grand Chain, Ill.
336 Pond Creek, Ill.
290 Oaktown, Ind.
290 Shelburn, Ind.
289 Waymetown, Ind.
241 Woodburn, Ind.
445 Adair, Iowa.
386 Claremont, Iowa.
386 Elgine, Iowa.
456 Nortonville, Ks.
230 Zilwaukee, Mich.

* Carlton,	25	2	200	Detroit, Mich.	
			211	Toledo, O.	
* Dundee,	25	2	200	Detroit, Mich.	
			211	Toledo, O.	
* Grosse Isle,	25	2	200	Detroit, Mich.	
			211	Toledo, O.	
Utica, Minn.,	75	5	307	Chicago, Ill.	

398 Stoutsville, Mo.

Bay Verte, N. B.,		85	8	Sackville, N. B.	

144 Wadesboro, N. C.
159 Coalburg. O.
201 Gypsum, O.
201 Vernon, O.
156 Allendale, S. C.

* Bloom,	Wis.,	60	4	307	Chicago, Ill.
* Colby,	"	100	7	307	" "
* Horn's Pier,	"	75	5	307	" "
* Greenleaf,	"	60	4	307	" "
* Lake Shore Junc.,	"	35	2	307	" "
* West Bend,	"	35	2	307	" "
* Wilton,	"	75	5	307	" "

The delivery charge to the Insane Asylum near Milledgeville, and to Midway, Ga., is 50 cents instead of 5 cents., as published in last JOURNAL.

SPECIAL RATE OFFICES.

The tariff to Birdsboro, Pa., is 25 cents more than special rate to Philadelphia; square rate not to be increased.

ATLANTIC CABLE BUSINESS.

We are informed that the Cable between Singapore and Hong Kong is now repaired. Direct telegraph communication to China and Japan is again established.

The Cable between Falmouth and Lisbon is broken. Business will be sent via other routes, rates unchanged.

The Continental rate to German Alsace and Lorraine is $1.50 from France instead of $1.10 as heretofore.

CUBA CABLE BUSINESS.

Communication by cable between Batabano and Santiago, in Cuba, is interrupted. Messages for the latter point will be mailed at Batabano, via steamers leaving two or three times per week. Messages for places beyond Santiago will be sent by telegraph and mail to Santiago, from which point they will be forwarded to destination.

The Cable between Jamaica and Aspinwall is now open for business. Tariff in addition to the rate to Kingston, Jamaica, five dollars, gold, for ten words, and fifty cents for each additional word.

Messages to Aspinwall by this route must have the words "Care of Nunes" inserted as part of the address.

WILLIAM ORTON,
President.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Oct. 28th, 1873.

On November 1st, Peru, Ind., office will be transferred from J. J. S. Wilson's district to J. F. Wallick's district.

G. H. MUMFORD, *Vice Pres't.*

The annual meeting of the Telegraphers' Mutual Life Insurance Association, to be held at 7 P. M., Nov. 5th, will be an important one. The question of limiting payments to $1,000 at death, and under what circumstances payments shall be made from reserved funds without calling for assessment, will be discussed. Some limitation seems imperative. The last assessment of four dollars proves this. It comes hard on many. Means should be taken at once to keep the Association above the fear of disintegration by reason of excessive assessments. By limiting payments to $1,000 and with a membership of 1,500, eight assessments would provide for twelve deaths. We hope action will be taken in this matter. The Association should be kept from peril. Its terms should be such that none need fear to join it. A large and interesting meeting is hoped for. The place of meeting is at 145 Broadway, N.Y.

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RED STAR LINE.

ANTWERP SERVICE.

APPOINTED TO CARRY THE BELGIAN AND UNITED STATES MAILS.

		From Antwerp.	From Philad'a.
"VADERLAND," Captain Vander Heyden,	2800 tons.	Nov. 12.	Oct. 22.
"RYDAL HALL," Captain Collin,	2114 tons.	Oct. 11.	Nov. 5.
"NEDERLAND," Captain H. W. James,	3000 tons.	Oct. 25.	Nov. 22.
"SWITZERLAND," Captain ——,	3000 tons.	Building.	

PRICES OF PASSAGE:

Cabin.....$100 gold.
Steerage.....35 currency.
Prepaid Certificates, $36 currency.

LIVERPOOL SERVICE.

	Tons.	Master.	From Liverp'l.	From Philad'a.
"ABBOTSFORD,".....	2588.	Findlay.	Oct. 29.	Nov. 20.
"KENILWORTH,".....	2588.	Putt.	Nov. 12.	Oct. 23.

PRICES OF PASSAGE:

Cabin.....$100 gold.
Steerage.....30 currency.
Prepaid Certificates, $32 currency.

Tickets will be sold here at lowest rates, good from Antwerp and Liverpool to all interior points in the United States, *via* the Pennsylvania Railroad and its connections, thus affording parties in this country a convenient and cheap opportunity of sending for their friends in Europe.

THE RED STAR LINE will give special attention to the comfort of steerage passengers; comfortable berths, well-ventilated sleeping apartments and good food will be furnished them.

An experienced Surgeon is attached to each vessel.

Freight will be received at all principal points in the West and South, in connection with the Pennsylvania Railroad, Southern Mail Steam-ship Company and Clyde's lines, and through Bills of Lading issued for Antwerp, Bremen, Hamburg, Havre, Amsterdam, Rotterdam, Liverpool, London, Glasgow, Belfast, Hull and Leith.

The Red Star Line docks at Philadelphia are in direct connection with the Pennsylvania Railroad, and all merchandise intended for points beyond Philadelphia can be transferred from the hold of the steamer to the cars without the expense to shippers and risk of damage by re-handling, which results from cartage.

For rates of freight and passage, and other information, apply to

PETER WRIGHT & SONS,

GENERAL AGENTS, PHILADELPHIA.

William Hunter & Co., Agents, Liverpool. | B. Vonder Becke, General European Agent, Antwerp

According to the account given of a hippopotamus family jar by a writer in *Land and Water*, who recently witnessed a domestic infelicity of this nature in the Zoölogical Gardens at London, nothing more extraordinary than this, in the way of a conjugal "row," could be imagined. The male and female hippopotami in the Gardens are known respectively as Obesh and Dil. Their youthful offspring, now eight months, and whose name is Guy Fawkes, was, until a few days ago, kept in the den with his mother. The family disturbance referred to above occurred when the time came for Guy Fawkes to be introduced to his father. The portcullis of old Dil's den having been raised, she and her offspring came out and marched towards Obesh, who was munching grass near by. As his wife approached him, Obesh trumpeted several times and grinned. Guy Fawkes went up to his father and began to rub his nose against the parental snout. This sort of thing lasted for two or three seconds, and suddenly old Dil rushed at Obesh, and the two gigantic beasts engaged for a few minutes in a savage fight, rearing upon their hind legs, clashing their tusks together, opening their portentous jaws, and biting at each other maliciously. Obesh was finally worsted, and was ignominiously driven into his pond, while the "old woman," with Guy Fawkes on her back, stared at him, grunting, and apparently threatening him, for three-quarters of an hour. At the expiration of that time, however, peace was declared, and the most affectionate family endearments known in the bright lexicon of hippopotami were exchanged between the now reconciled and contented trio. Obesh has, for a hippopotamus, a rather disagreeable reputation, and having been in the Gardens for twenty-three years, he is, in a measure, to the other animals what Mr. William Dorrit was to his companions of the Marshalsea.

WATTS & COMPANY,

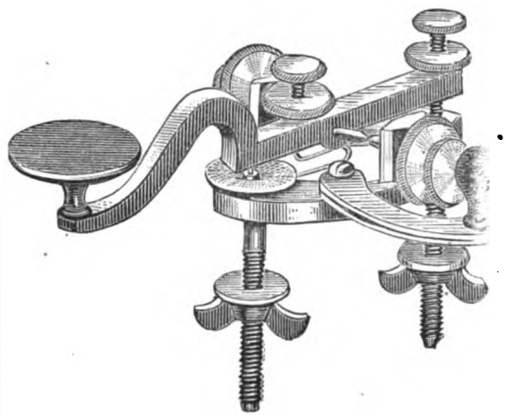
47 Holliday Street,

Baltimore, Md.,

SOLE MANUFACTURERS OF THE

PATENT CIRCUIT-CLOSER KEY,

Which has met with marked success.



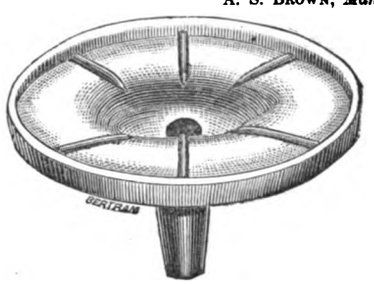
Price, $5 50 plain..$7 nickel-plated.

The following is from a competent judge, written after some weeks' trial.

145 BROADWAY, NEW YORK, Sept. 22d, 1873.

DEAR SIR,—Your circuit-closing attachment on the key, left with me for trial, is pronounced by all who have used it a decided and much-needed improvement on the common form.

Respectfully,
A. S. BROWN, *Manager.*



The Best Form of Battery Insulator Offered.

SIMPLE AND PERFECT.

Made of porcelain, handsome in appearance. Occupies little more space than the cell it supports. Each cell of battery completely isolated. Leakage is reduced to the minimum by the use of it.

General Superintendent Van Horn, Southern Division W. U. Tel. Co., writes of it:

"We have now in use a thousand or fifteen hundred of your battery insulators, and expect to order many more before the close of the year.

We have never used any battery insulator that equals it in any respect. In fact, it appears to be as near perfect as we can reasonably expect, in a contrivance for that purpose."

Price 40 cents

We offer a very excellent article of Galvanized Wire, superior to any in the market. The linemen on Baltimore and Ohio R. R. say they have never seen its equal for toughness and flexibility.

Special attention given to building.

Estimates given for any amount of material for telegraph construction or extension.

SWITCHES, GALVANOMETERS, RESISTANCE COILS &c., to order.

Designs for Switch Boards for special service furnished.

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Governed by the same Rules and Regulations as the Western Union Telegraph Company.

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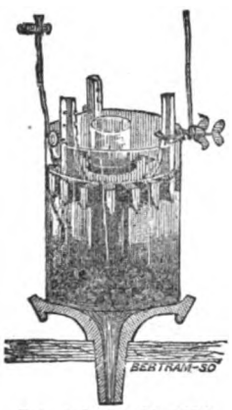
Baltimore, Md.,

MANUFACTURE

Telegraph and Electrical Instruments

OF EVERY DESCRIPTION.

Facilities for supplying any description of Machinery or Material equal to any in the United States.



Patented Dec. 31, 1872.

Over SIX THOUSAND cells of the Baltimore Battery in use by the Gold and Stock Telegraph Company of New York in their Private Line Department, as a form of the gravity battery, combining the valuable principles of

Economy, Cleanliness and Constancy,

"—in fact a base-burner."

F. L. POPE,
Telegrapher, July 5th, '73.

SELF-FEEDING,

No Sulphate of Copper can reach the Sulphate of Zinc Solution.

The shape of Zinc and Copper, which, with the tube, were patented December 31st, 1872, secures the largest surface with least weight of the metals. Half pound sulphate copper per month, ample supply for No. 2, or 3.

Following is one of the many letters we have from reliable telegraphers:

PIEDMONT, W. Va., September 28th, 1873.

Messrs. WATTS & Co.,
Baltimore, Md.

GENTLEMEN:—On January 1st, 1873, I put up 75 cells of your No. 2, Baltimore Battery, in place of 40 cells of carbon, from which two railroad wires of 100 miles each, are supplied. It has not since been taken down or cleaned, and has required no attention, except to fill the tubes with blue stone, once each month, and replenish the fluid once or twice during this period, made necessary by evaporation.

I am fully convinced, from long experience, that this is superior to any other form of the gravity battery.

It has now been in constant use for nine months, and will not need new zinc until after January next.

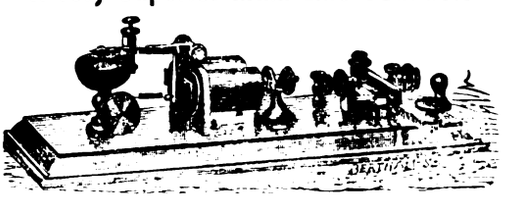
Respectfully,
J. G. NESBITT, *Manager.*

ORDERS FOR THIS BATTERY PROMPTLY FILLED.

A large stock constantly on hand.

No. 1 for Electro-motors, R. R. signals or similar service, $2.25
No. 2 ordinary local or Printing Telegraph main $1.75
No. 3 ordinary main $1.25

A very Superior Main Line Sounder.



Brass, $22.50. Nickel-plated, $25.00.

For wrecking purposes or temporary offices, this instrument is without a rival.

A perfect combination, handsome, good-sounding instrument.

NO LOCAL REQUIRED.

Well seasoned black walnut box, large enough for pencils, paper, plyers and office wire, in addition to the instrument, $4.

Larger size for climbers, vises, &c., $5.50.

RELAYS, SOUNDERS AND KEYS,

always on hand, plain or plated.

Our Challange Sounder is the noisest instrument made.

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8 Dey Street, New York,

MANUFACTURERS, DEALERS and IMPORTERS

OF

TELEGRAPH MACHINERY, SUPPLIES

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Line Equipment of every Description.

MATERIAL AND INSTRUMENTS

always on hand, for the equipment of lines of any length, at a moment's notice.

We furnish first-class goods at low prices. Liberal arrangements made with Superintendents, Contractors and Builders of Telegraph Lines.

Registers	$38 00 to	$45 00
Spring Registers	47 50	.....
Relays	14 00 to	18 00
Sounders	3 50 to	7 50
Keys	4 00 to	6 50
Main Line Sounders	14 00 to	18 00
Combination Sets	20 00 to	30 00

Galvanometers, $7 00 upward.

POCKET INSTRUMENTS, Nickel Plated, in Hard Rubber Cases, 1¼x2x5 inches.

CUT-OUTS, Plug, Peg or Button, with or without Lightning Arresters, for one, two or more Lines.

JONES' PATENT LOCK SWITCHES, the best and cheapest in use, with or without Lightning Arresters.

PEG or PIN, CULGAN, REPEATING, GROUND, LOCAL, BATTERY and SINGLE BUTTON SWITCHES.

LIGHTNING ARRESTERS for any number of wires, of most approved patterns.

Electro-Magnets,
Permanent Magnets,
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Electric Motors,
Printing and Dial Instruments
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RHUMKORFF COILS, from ¼ to 10 inch spark.

GEISSLER'S TUBES, from $1.00 upward.

ELECTRICAL CALL AND ALARM BELLS in great variety, from $6.50 upward.

INSTRUMENTS furnished, Nickel Plated, at 20 per cent. advance on List Prices.

OFFICE WIRES, from 80c. to $1.25 per pound.

GUTTA-PERCHA COVERED WIRES, all sizes.

BISHOP'S NEW COMPOUND COVERED WIRE, for running into offices, 4c. per foot.

MAGNET WIRES, in Silk and Cotton, at Factory prices.

INSULATED WIRES for special purposes made to order.

SILK COVERED SWITCH CORD, one, two or more conductors.

PATENT MESSAGE HOOKS, the best ever introduced, prices 65c. and 75c. per dozen.

MANIFOLD PAPER and AGATE STYLUS at bottom prices.

Cables and Submarine Wires.
Repairers' Tools and Tool Bags.
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Insulators of every Description.
Brackets, Pins and Spikes.

HILL, CALLAUD, GROVE, BUNSEN, CARBON, DANIELLS, LE CLANCHE, NITRO-CHROMIC, AND OTHER STYLES OF BATTERY IN ANY QUANTITIES.

PURE CHEMICALS AT LOWEST PRICES.

SULPHATE OF COPPER A SPECIALTY, AND PRICES VERY LOW.

CARBON PLATES made to order for Grenil, Smee, Stohrer and other Batteries.

OFFICE FIXTURES AND BATTERY UTENSILS OF EVERY DESCRIPTION.

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ALL STANDARD WORKS on ELECTRICITY AND TELEGRAPHY.

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New and Superior patterns of

STANDARD TELEGRAPH INSTRUMENTS.

Their RELAYS, SOUNDERS, and KEYS which have been specially designed by Mr. F. L. Pope, are elegantly designed, thoroughly well finished and scientifically adapted to the service required and are recommended as SUPERIOR TO ANY HITHERTO OFFERED.

In addition to these ALL DESCRIPTIONS OF TELEGRAPH MATERIALS AND SUPPLIES are furnished, such as

INSULATORS, BATTERIES,
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MAGNETIC AND DIAL INSTRUMENTS.

We have for sale also THE NONPAREIL TELEGRAPH INSTRUMENT for amateurs, learners and short lines.

A COMBINATION SET, comprising Sounder and Key on a handsome rosewood base.

Bradley's Box Relays and Sounders.
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any desired size and resistance, at manufacturers' lowest price.

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LECLANCHÉ BATTERIES.

CAUTION.

All persons are hereby notified that Batteries

INFRINGING UPON OUR PATENT

are in the market (some of them nearly worthless). The Public are warned against using any such infringement, as in every case the guilty parties will be prosecuted to the fullest extent of the law. The GENUINE BATTERIES have the words "PILE LECLANCHÉ" on the Carbons and Glasses. Any information concerning such infringements will be thankfully received by the

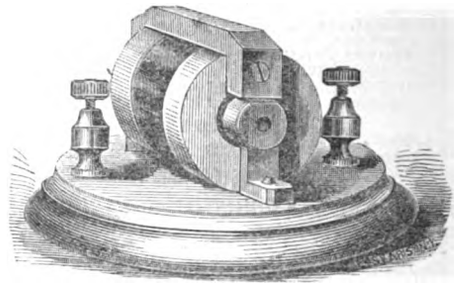
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No. 40 West 18th St.

NEW YORK, Oct. 11th, 1873.

SOMETHING NEW.

"The Rattler" Telegraph Sounder.



(PATENT APPLIED FOR.)

This is a very simple and effective Instrument, and, as it does not require any spring to draw the lever back, is always adjusted.

PRICE, - - - - $3.50.

L. G. TILLOTSON & CO.,

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TILLOTSON'S

MAIN LINE SOUNDERS

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NICKEL PLATED OR IN BRASS.

Illustrated on page 64 of our Catalogue.

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We furnish all our machinery Nickel Plated at a small advance over the price of the same articles in Brass.

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SUCCESSORS TO

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GALVANIZED AND PLAIN WIRE,

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ALWAYS ON HAND.

INSTRUMENTS REPAIRED AT SHORT NOTICE.

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JOURNAL OF THE TELEGRAPH.

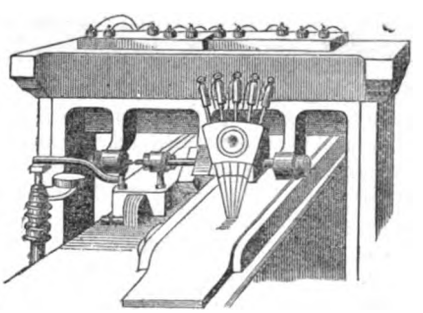
VOL. VI. NO. 24. NEW YORK, NOVEMBER 15, 1873. WHOLE NO. 145.

MAGNETISM.

Physicists find that in horse-shoe magnets the portative force increases with the time of contact of an armature. The author wished to know whether this increased magnetism would be shown by his method of induction-currents. He placed round one of the braches a loop of wire connected with a galvanometer, applied an armature of soft iron, and observed the current of demagnetization; first, when magnet and armature had been in contact only a few seconds, and next, when the contact was prolonged several hours or days. The current was always the same, and the result is thus in discord with that above stated. M. Gaugain further determined the curve of demagnetization of an electro-magnet, placing his wire loop successively at different points of the bar, and observing for each position the strength of induced current developed at the moment of interruption of the inducting current. The curve rises from the ends of the branches, reaches a maximum at a point covered by the bobbins, and then gradually falls to the heel. Thus its inclination changes sign four times throughout the length of the bar. Now, if one examines with a magnetized needle the magnetic state of an electro-magnet, one also finds that the magnetism changes sign four times. Starting from the boreal extremity, for example, the magnetism at the other side of the nearest bobbin is austral, it is zero at the centre of the bar, becomes boreal on approaching the second bobbin, and, finally, is austral beyond this bobbin at the end of the bar. This correlation is a striking one. In the case just described no armature was applied; where there is such, then, to obtain the curve of demagnetization a new series of experiments have to be made. The loop being placed successively at various points of the bar, one determines for each point the value of the detachment-current (meaning by this the current induced when the armature is detached). By means of this curve, and the curve of demagnetization obtained when no armature is applied, one may easily trace the curve of demagnetization for the case in which the armature is applied. Studying this curve, it appears that the increase of magnetism near the extremities on application of the armature is enormous; it may be 60 or 100 times the magnetism found before application. In the case of a permanent magnet, the increase on application of an armature was not more than five or six times the previous magnetism. From this difference it results that if we compare an electro-magnet and an ordinary magnet by Coulomb's method of oscillations, and the method of weights carried, we should find by the former that the electro-magnet is weaker than the magnet, and by the second that the magnet is the weaker. These results are not in contradiction; the first method measuring the magnetic intensity which exists before the application of the armature, while the carried weight depends on the magnetic state produced after the armature is applied, and, as we have seen, the modification of magnetic state by the presence of an armature is very different in electro-magnets and in magnets. M. GAUGAIN.

AUTOMATIC TELEGRAPHS—BONELLI'S CHEMICAL TELEGRAPH.

The invention of Chevalier Bonelli is for automatic transmission and the delivery of *fac similes* of the original message. The apparatus consists of a long stage or railroad on a table, on which travels a wagon, containing, on the left side of the lower half, a box of raised metal types, and on the right side of the upper half a strip of chemically prepared paper. Over the middle of the railway is a bridge, under which the wagon has to pass when transmitting or receiving a message. There are two buffers for receiving the wagon at the ends of its journeys. Just in front of the buffers, and level with the rail, is a hook, which engages with an eye at the upper end of the wagon, and holds it until a current traverses the line and releases it by means of an electro-magnet. On the left-hand side of the bridge, over the raised types, is a type-comb, consisting of five



movable teeth, insulated from each other, which are connected to the ends of five wires, going to a similar number of styles at the receiving apparatus. As the wagon, with the types looking upwards, passes underneath the type-comb, the teeth come lightly into contact with the raised portions of the types, and close the circuit whilst the contact lasts. Thus letter after letter is transmitted.

The right side of the bridge, which spans the middle of the rails, is appropriated to the reception of messages. It consists of a writing-comb, composed of five teeth, made of an alloy not liable to corrosion, insulated from each other, and pressing lightly upon the paper strip. This comb would produce, if each tooth were traversed at the same time by an electric current, five lines, something like the lines on music-paper. As, however, they are each only traversed by a current during the time some portion of a type is underneath the corresponding tooth of the type-comb at the sending station, they can only give lines at such intervals and of such length as are determined by the form of the type.

With this system, any deviation from synchronism is of small importance, as the difference in one way or the other will only make the letters printed either a little narrower or broader than the types used in sending, and in this consists the advantage of the Bonelli arrangement over those of Bain and Bakewell.

A very high rate of speed is, of course, attainable by a system of this character, but this advantage is more than neutralized, owing to the fact that five wires are required in its operation, and that before transmission it is necessary to set the message in type.

The paper intended for receiving permanent printing by the Bonelli instrument, for distribution to the public, is prepared by being saturated in a solution of nitrate of manganese, which yields, under the action of the current, a light, brown-colored precipitate. That which is termed "fugitive printing," as for press work, by which the impressions are not necessarily of a permanent character, is done with paper prepared with a solution of iodide of potassium, which gives letters, at first, an iodine character, but which, in course of time, lose their intensity and wholly fade away.

THE HEROES OF SHREVEPORT.

LETTER OF SUPERINTENDENT BAKER.

SUPERINTENDENT'S OFFICE, SIXTH DISTRICT,
LITTLE ROCK, Oct. 9th, 1873.

JOHN VAN HORNE, Esq., Gen'l Supt., Louisville, Ky.:

Dear Sir: I telegraphed you yesterday of the death of Alfred Saville, manager at Shreveport, La., of yellow fever, making the fourth victim of the disease among the employés of this Company at that place within less than one month's time.

On the 1st of September our force at Shreveport consisted of Geo. J. Rae, manager, Thomas M. Jackson, and Charles Newton, operators, G. H. Reinicke, local repairer, and Louis Lanone and Eddy Pike, messengers—six in all. On the 11th not one of them was left for duty, except one of the messengers, and the office was closed. On the 3d Mr. Newton became alarmed and resigned. The others elected to remain. On the 6th, Jackson and Reinicke were reported sick of the fever, leaving Rae alone. Heroically he stood to his lonely post, with death staring him in the face, until the 11th, when he, too, was stricken down. Jackson and Reinicke died on the 13th, Rae on the 15th. Of the messengers I could hear nothing, except that one of them, Eddie Pike, had taken the fever. On the 15th I engaged Mr. Saulsbury, operator of the Texas and Pacific R. R. Co., who had an instrument in circuit at the depot of that Company, in the edge of the town, to send and receive as many messages of an urgent character for us as his railroad duties would permit. On the 14th Mr. H. C. Davis, an acclimated operator, sent to our aid by Mr. Flanery, arrived at Shreveport, and we were enabled, partially, to resume business. On the 12th I accepted the volunteered services of Mr. Alfred Saville, and he arrived at Shreveport on the 16th, taking charge as manager. I also accepted the services of Mr. Wm. Bernard, formerly of the Cincinnati office, who arrived here *en route* to Shreveport, just in time to help us nurse and bury

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Mr. John A. Conley, formerly of the Huntsville, Ala., office, whom I had employed for the Little Rock office, but who was taken sick with the yellow fever in Memphis, and arrived here with the disease upon him. He died on the 18th, thus adding one more to the list of victims in this district. Mr. B. L. Smith, who recovered from the fever this season at Pensacola, also volunteered, and was sent to Shreveport. By the 22d I once more had a force there, sufficient to transact such business as offered; but, in the meantime, the epidemic had transformed the town into a hospital. All who could had fled, reducing the population to about 4,000. Of these, 700 to 1,000 were constantly sick, and the deaths ran from twenty to forty daily. The fever was of a very malignant type, killing over sixty per cent. of those attacked. Business was generally suspended, nearly all business houses being closed. The railroad trains and stage lines were stopped, and the town almost entirely cut off from aid, save by telegraph. Fortunate it was, indeed, for the doomed place, that a few devoted men were found who were willing, at the risk of life, to keep open the doors of the Western Union Telegraph office. The Company having generously authorized free transfers of money, subscribed at points throughout the country, for the relief of the sick and destitute, and our banker, Mr. George A. Pike, agreeing to pay these transfers for us at Shrevesport, free of charge, for exchange, the telegraph wires became at once the sole means of relief. All eyes and hearts were turned upon the little band of men who so faithfully worked them amidst such danger. Electricity was the only thing that the outside world could not quarantine, and the telegraph became the sheet anchor of all those people during the fearful plague which still prevails. Until Mr. Pike's funds gave out, from accumulating at other points, we paid out transfers at the rate of over $250 per day. This was in addition to the telegraphic checks, which he and other bankers paid for the relief of the suffering, and which were sent free over our lines, without passing through the hands of our transfer agents. The lives that have been lost in our service at Shreveport were not, therefore, thrown away or uselessly sacrificed. They were lost in the noblest of battles, —that against pestilence for the relief of suffering humanity.

After the loss of so many valuable men, I hoped the epidemic would not again invade our office, but our poor fellows seemed marked for destruction. The office seemed to be infected. I was notified on the 30th that Mr. Saville had taken the fever. Doctors Choppin and Hurd, of New Orleans, and the best nurses to be found, were at once placed in attendance upon him, and his case progressed so favorably for a few days that we all were sanguine of his recovery. But the sudden change in temperature on the night of the 6th of October, when the mercury fell fifteen degrees within an hour at Shreveport, proved fatal to him, and to many others. Notwithstanding all that could be done, his physicians were compelled to announce his case hopeless on the 7th. I at once telegraphed his wife, at Grenada, Miss., of his condition, and she sent him a farewell message. I never wish to hear such another. It sounded like a wail passing over the wires. Saville received and understood that message, and said: "I want for nothing now; I am near heaven." He was attended in his last moments by the Rev. Dr. Wilkinson, who noted his last words and message to his wife. He was buried yesterday at 12.

I have forwarded copies of your message, and of Mr. Orton's, to Mrs. Saville, and to Mr. Jackson's mother, at Dalton, Ga. Mr. L'Hommedieu will forward copies to the relatives of Rae and Reinicke. We will gather such particulars of the circumstances of the relatives of those who have lost their lives in the Company's service as we can, and forward them, as Mr. Orton directs.

The fever continues to rage at Shreveport, and I dread to listen to messages coming thence to me. The present force consists of Wm. Bernard, acting manager; H. C. Davis and B. L. Smith, operators, and Thos. Logan, clerk. They show no signs of fear, but stand to their posts, each like the Roman soldier at the gate of Pompeii, but facing a more terrible foe. The Company may well hold such men in high esteem. It would be in vain to look for stronger proof of devotion to duty, or for greater sacrifices to the cause of suffering humanity, than we find in the cases of Rae, Jackson, Reinicke and Saville. There are few operators who, to-day, sitting at their instruments, if they have heard his story, cannot imagine poor George Rae, standing his five days of lonely watch, with his comrades dying around him, waiting, without relief, for yellow fever and death. There is no man who can think, without admiration, of Saville's volunteering to go into the danger, because, as he said to me, he thought "it was his duty, and as so many were running away, he wished to go to the aid of the sick and suffering," or without a tear of sympathy, of his death among strangers, and that last heart-broken message from his wife.

I would suggest that at some future time the Company cause to be placed over the remains of such of these faithful ones as may lie in the cemetery at Shreveport an enduring stone, that will mark their resting place, and tell how they lost their lives.

Yours, truly,

L. C. Baker, Sup't.

THE BEES AS ARCHITECTS.

Man is obliged to use all sorts of engines for measurement—angles, rules, plumb lines—to produce his buildings and to guide his hand; the bee executes her work immediately from her mind, without instruments or tools of any kind. "She has successfully solved a problem in higher mathematics, which the discovery of the differential calculus, a century and a half ago, alone enables us to solve at all without the greatest difficulty." "The inclination of the planes of the cells is always just, so that, if the surfaces on which she works are unequal, still the axis running through it is in the true direction, and the junction of the two axes form the angle of sixty degrees as accurately as if there were none." The manner in which she adapts her work to the requirements of the moment and the place is marvellous. In order to test their ingenuity, Huber glazed the interior of a hive, with the exception of certain bits of wood fastened on the sides. The bees cannot make their work adhere to glass, and they began to build horizontally from side to side; he interposed other plates of glass in different directions, and they curved their combs in the strangest shapes, in order to make them reach the wooden supports. He says that this proceeding denoted more than an instinct, as glass was not a substance against which bees could be warned by Nature, and that they changed the direction of the work before reaching the glass, at the distance precisely suitable for making the necessary turns, enlarging the cells on the outer side greatly, and on the inner side diminishing them proportionately. As the different insects were working on the different sides, there must have been some means of communicating the proportion to be observed, while the bottom being common to both sets of cells, the difficulty of thus regularly varying their dimensions must have been great indeed.—*Scientific American.*

ELECTRIC RAILROAD SIGNALS AT VIENNA.

Mr. Robert James Manos, M. D., reporter for the "Society of Arts" at the Vienna Exhibition, describes as follows three electric signal systems exhibited at Vienna, all by Englishmen:

Mr. Preece has sent to the Exhibition a complete set of the apparatus (4,866) he employs for the "block" system of railway signaling on the Southwestern line. The fundamental principle in this system is that trains on the same line are to be kept apart by a certain and unvariable interval of space, instead of by an uncertain and unreliable interval of time. In Mr. Preece's method the signal which opens any "blocked" section of line is made by the signalman at the advanced end where the section has to be cleared, and no signal is held to be effective and complete until it has been acknowledged by the receiver, and "repeated" back to the sender. Mr. Preece also lays great stress upon the fact that the miniature apparatus which he employs in the signalman's room, and which is the apparatus that is shown in the Exhibition, shall all have identically the same form as the instruments used for displaying the effective signals on the line. The switch in both instances is worked by the same movement of the arm. In both instances the horizontal red arm on the signal-post means the same thing. A strong and uniform association is thus established in the mind of the signalman, which becomes almost an instinct, and is never confused or disturbed in moments of emergency. It is also an important part of the arrangements that the horizontal or "danger" position of the semaphore arm is maintained by gravity, and it is the dropping of the arm that is brought about by electrical action. If any accident occurs to the electric wires, so that the transmission of the currents is arrested, all that can happen is that the danger signal remains resolutely and obstinately displayed, and that all traffic is for the time suspended. The effective parts in the instruments are of extreme simplicity. In every instance, excepting one, the movement is effected by converting a core of soft iron into a magnet when an electric current is sent through a surrounding coil. The semaphore arm is dropped by an induced magnet pulling up its weighted end. The bell is rung by an electro-magnet acting on the vertical elastic rod of its hammer. The semaphore sends back a "repetition" signal for itself to the station from which it is worked, to show how its arm is placed; and it does this by turning on a current from one or other of two distinct batteries by their negative or positive pole as required. The current, as it rings the bell, acts on a permanent magnet, hung between the poles of the electro-magnet, so that the magnet is drawn to the right or to the left as the "danger" or "clear" signal is to be recorded. The best method of working the system requires three wires between the stations; one wire to connect the bells and repetition signals of both stations, a second to connect the switch of one with the semaphore of the other, and a third to connect the semaphore of that station with the switch of the other. The advantage of this is that the currents which effect the signals are maintained so long as they have to be displayed, and lightning, electric clouds and earth currents are powerless to produce derangement. Each signal station, unless it is a terminal one, needs a double set of the four instruments; namely, bell-key, bell and repetition signal, switch and semaphore post. By a differently arranged apparatus one wire can be made to work all the signals; but the current is then a momentary and interrupted one, and other expedients have to be brought into play for obviating the occurrence of disturbance

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from lightning or earth currents. The bell-key turns on its electric current by pressing the end of a flat spring, which forms one pole of the battery, into contact with a metallic pin or standard in communication with the other pole—the switch accomplishes the same thing when lying across a brass arc in one direction, but not when it is thrown fully back the other way. The brass arc, a little above the pivot of the switch handle, it will be observed, is cut through. The pivot is in communication with one pole of the battery, one-half of the interrupted arc with the other pole, and the other half with the earth. The three binding screws of the switch accomplish these three different communications. The largest semaphore instrument shown by Mr. Preece is an apparatus contrived to warn a signalman when a signal lamp that is out of the range of direct observation is extinguished. A brass arc placed above the flame of the lamp is expanded, and pushes up an elastic bar, so as to "break contact" and interrupt an electric current; when the lamp goes out, the arc cools and contracts, the bar settles back and renews contact, and an electric current is turned on to the signal room, to make a temporary magnet there pull over an index so as to show "light out" on the face of the instrument.

Mr. Harley, of Barnsbury, proposes to work the "block system" of railway signaling by a single wire, that shall have complete immunity from disturbance from lightning, electric clouds, or earth currents, and the apparatus which he employs, and which is shown by him in the Exhibition (4,842), is of an altogether novel construction in one particular. The needle which swings vertically on the dial is *not a magnet*. It is a pointer of soft iron, suspended upon a centre pivot, carrying horizontally beneath the pivot a flat soft iron ring. The ring hangs a little way beneath the pivot by a rigid connection, and when horizontal keeps the pointer vertical by its own weight. A permanent horse-shoe magnet above directs its poles towards the flat edges of the ring, and, at the same time, the ring is invested by the coils of an electric-current conveying wire. When no current is traversing the coil, the flat ring keeps horizontal, because it is pulled up equally both ways by the poles of the magnet, and is held back equally by its rigid attachment to the pivot. But when a current traverses the coil, the flat ring becomes temporarily an induced magnet, and is pulled up on one side and pushed down on the other by the opposite poles of the permanent magnet, and the pointer, at the same time, is consequently moved on the dial in the same direction. The signalman who sends a signal can turn on either a positive or a negative current by using one or other of two contact levers at discretion. As he turns on one or the other, he makes the needle traverse to the right to signify "all clear," or to the left to signify "stop." When the receiving signalman is warned by a bell that a signal is coming, he presses a knob, and so switches the current from the bell instrument to the signal instrument. In doing so, he draws back two ivory pins, which allow the needle-pointer to traverse freely to either side; and when he releases the knob, the pins start back and intercept the needle, and so fix it as a continued record. It is a distinctive attribute of this ingenious apparatus, due to the inventor of the soft iron ring and pointer, that extraneous magnetic force is absolutely powerless over its indications. While the apparatus is at work, Mr. Harley flashes a powerful magnet about it, above, below and around, in a way which would put the ordinary magnet-needle instruments of the needle-telegraph entirely out of the field, but without producing the slightest derangement in its signaling operations.

Messrs. Carr & Barlow, of Old Palace Yard, propose to dispense with the large staff of signalmen in working the block system, and to make the traveling engine which drags the train do their work. The arrangement by which they conceive this may be effected is shown in a working model. A signal instrument is placed on the engine, where it is under the eye of the driver. When the engine enters upon a distinct segment of the railway, a trigger is pressed as its bottom passes a projection on the line, and this drops a screen on the signal instrument, and shows "stop," unless a preceding train has passed out from the other end of the segment, pressed down a lever there by its wheel, and turned on a backward current of electricity; then the current is communicated to the engine signal-instrument, at the same time that the trigger is pressed, by two curved metal springs on its bottom rubbing against corresponding metal plates on the line, and two screens are dropped on the instrument, one mechanically and one electrically, and "Go on," instead of "Stop," is displayed. Midway of the block-segment a transmission instrument and galvanic battery are placed, the former on a low post near the line. Contacts are made and electrical currents formed on this instrument by a very pretty contrivance. A kind of flat brass hammer falls into a wedged-shaped interval, separating two steel faces. When the hammer is down, the current passes from one steel face to the other through it; when the hammer is up, the current is interrupted. As the engine passes abreast of the transmission instrument, it presses a lever by its wheel, drops one hammer, and establishes a backward current, and lifts the other hammer to interrupt the current coming in from the front. When the engine passes out at the far end of the block-segment, it drops again the second hammer, and re-establishes its current to give the signal "All clear."—*Railroad Gazette.*

SIGNALS AT THE GRAND CENTRAL DEPOT IN NEW YORK.

The New Haven (Conn.) *Register*, of recent date, says: "On Saturday last, at the Grand Central Depot in New York, by the kindness of station-master Franklin, we spent half an hour in the signal office of glass, at the north end of the depot, where a full view of all incoming and departing trains was obtained, and the thorough system of signalizing in force fully explained. About 150 trains leave and arrrive at this station every day, and the departure and arrival of every one is controlled by the signal officer. This officer has between thirty and forty different telegraph signals to touch, on a table at his side, and none of them are labeled. He touches one half an hour previous to the departure of an express train, another at twenty minutes previous to the departure of a way train, and the movement rings a bell in the waiting-room from which the passengers are to depart. The doors open instantaneously, and the crowd of passengers can be seen making their way for seats in the train for which they have tickets. He then touches a key which causes the engineer to back his engine into position where he can be readily ordered on to his train. At five minutes before the hour of departure he rings a bell in the waiting-room and baggage-room, notifying them not to check any more baggage and not to sell any more tickets, and when the time is up he strikes a key to close the doors, and no more passengers can enter for that train. He strikes a signal which throws up a letter, either X, for the Harlem; Z for the Hudson River; or Y, for the New York, New Haven and Hartford road, and at the same time rings a bell beside the engine, which notifies the engineer to back down. He then touches a key to ring a bell notifying the brakemen to couple on, and at the time of starting strikes a bell, and the 'All aboard' of the conductor is simultaneously heard. As soon as the train starts this officer makes a record of the departure, and immediately telegraphs to Mott Haven that such a train has left, with so many cars, and after raising signals at Fifty-third and Fifty-sixth streets, so that no incoming trains shall interfere, his duties with the outgoing train are ended.

"Of incoming trains he had also a perfect control. Whenever a train passes the junction near Mott Haven, the operator there telegraphs where it is from, how many cars, and the time it passed. At Ninety-sixth street the train strikes a signal which sets a bell ringing in the signal office, which continues until the train reaches Seventy-sixth street, and then ceases. At Sixty-first street another signal is struck which rings a bell at the signal office, which rings until the train arrives at Fifty-sixth street. If the officer in charge sees that everything is clear for the train, he allows it to run in; if otherwise, he throws out a flying signal at Fiftieth-street, which will stop the train until it is ready for the entrance to the 'Grand Central Depot.' The departure and arrival of trains so frequently, without the least delay or accident, is a marvel, and is almost wholly dependent upon the signal officer. With the present arrangement and competent officers in charge, an accident to an incoming or outgoing train is an impossibility."

TAYLOR ADAMS' GRAVE.

The Day of All Saints, set apart in commemoration of the saints to whom no special day has been assigned, is one of the most important and imposing festivals of the Catholic Church.

A clear sky, a bright sun and a gentle, bracing breeze, just cool enough to be pleasant. The crowd, hurrying along as on All Saints' Days for generations past, was large, and it began to move at an early hour in the morning, jostling each other, and filling the cars, and gathering in multitudes in the silent cities of the dead, where each could claim a loved and lost one, and silently and sorrowfully doing their work of love that told a story of a memory cherished, a voice remembered and an image shrined in the heart.

The stately mausoleum bore its tribute of flowers, and the lowly mound which it shadowed, nestling beside it, too, had its wreath.

Among the most noticeable decorations at the St. Joseph Cemetery, on Washington street, New Orleans, was the grave of the late Taylor Adams, who was so well and favorably known in connection with the Western Union Telegraph office here. Immediately facing the vault that contains all that is mortal of the genial Taylor stood a table with complete telegraphic appliances—the relay, sounder, key and battery attached; the whole encircled by an immense wreath of white artificial flowers, and covered with white crape.

The battery, which stands under the table, was dry, with its wires disconnected, indicating that no vital spark was in it; is of the Daniel form, the most constant and unfailing of galvanic apparatus, and typified the dead operator, who stood first among the foremost of his profession, and who in life never failed to respond to the severest trials of his arduous business. The relay, sounder and key were without springs, and were voiceless and motionless, like the dead. Beside the table stood a messenger boy, but no message of poor Taylor's receiving will ever be given him.

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TELEGRAPHERS' MUTUAL BENEFIT ASSOCIATION.

The annual meeting of the Telegraphers' Mutual Life Insurance Association was held, as advertised, at 7½ P. M., Wednesday, Nov. 5th, at 145 Broadway, N. Y. A large representation from abroad was present. The meeting organized promptly by the appointment of Mr. J. D. Reid as chairman. At the invitation of the chairman, after a brief personal introduction, Mr. W. O. Lewis, of New York, and Mr. James F. Morrison, of Baltimore, made brief addresses, felicitating the Association upon the work it had accomplished, and expressing hopes for its future usefulness.

At the close of their remarks, Hon. William Orton, who is a member of the Association, entered the room, and was warmly welcomed. On invitation of the chairman, Mr. Orton spoke about as follows:

MR. CHAIRMAN AND GENTLEMEN: I need not, I trust, assure you how entirely I sympathize with the purposes you seek to accomplish by this meeting. Charity is one of the first and highest duties imposed upon us by God and by virtue of our own humanity. It ceases to become burdensome in proportion as it becomes universal.

That men engaged in a common occupation, united together by the ties which spring from daily association, should conceive for each other a warm attachment, is but natural. That men so engaged and so related to each other should feel inclined to stand together and contribute to each other's necessities, and especially seek to make provision for the helpless, the aged, and the young that are left behind us when we are taken away, is also but an instinct of humanity. When, therefore, the suggestion was first made to me some years ago, of the formation of a Universal Life Insurance Association for the profession, I gave it my hearty personal encouragement; at the same time it did not seem proper that, officially, I should seek to exert my influence in bringing it about.

I do not now remember how long ago it was that after submitting the matter of your organization to the attention of the Executive Committee of the Western Union Telegraph Company, and anxious that they should sympathize with it, I was authorized by them to make a proposition that if the membership should be so increased as to enable a payment of $1,000 n the event of the death of a member of the Association, and limit payment to that amount, that the Company would contribute $100 in addition thereto. My recollection is, that prior to that time, the amount the Association was able to pay was only $400 or $500. Subsequently, under the active exertions of the gentlemen who took an interest in it, the membership was so far increased as to enable the Association to make an appropriation of a $1,000 in every case of the death of a member. $1,000 seemed to me as much as an association of this kind was called upon to pay. To be able to do that was a sufficient success. In order to contribute to this result, I induced the action on the part of the Executive Committee. I had lost sight of the matter until, on inquiry, I was surprised and gratified to find that the membership had become so large that the condition the Executive Committee had attached to the contribution of $100 had become inoperative. Yet, while rejoicing at this prosperity, I apprehended a condition of things might ensue which would prove burdensome, and lead to such a decline in membership that the payment of $1,000 could not be continued.

Now, I do not know whether there is any danger of such a result, and am not prepared, at this moment, in view of the fact that the term of the offer of the Executive Committee has expired, to make a renewal of that offer. I have no authority to do so. But I will say, that such influence as I may possess will be promptly rendered to bring about this result, and bring the Company in direct relations with the Association, if deemed by you advisable.

I trust I shall be acquitted of any intention to make a matter of business out of this. No one realizes more fully than I do how much the prosperity of the Company, over which I have the honor to preside, depends upon the loyalty and fidelity of its employees. No management would be entitled to the respect, loyalty and fidelity of such a body of men as, I am proud to say, compose the force of the Western Union Company, if it did not take some fitting opportunity to testify, not merely their respect for them individually, but their sympathy with them in the common affairs of life. So far as I can do so, I wish now to earnestly represent and express to you how much the Company appreciate the integrity and fidelity of its men, and how much we attribute to them that great measure of success that has attended the progress of our business for the last few years. I have not come here officially to make any suggestions but, in my capacity as a member of the Association, to contribute, so far as I am able, by way of suggestion and advice, as I may be invited so to do, towards making the Association a success. Yet, if I can do anything in my official capacity—anything on the part of the Company—towards that end, I pledge to you to continue my earnest efforts and good offices in that behalf.

REPORT OF THE TREASURER.

The following is the report of Mr. A. S. Brown, the Treasurer, which, on being read, was accepted and ordered to be filed:

NEW YORK, Nov. 5, 1873.

Balance on hand Nov. 1, 1872		$2,905 72
Received from 475 new members, 1677 to 2151		712 50
Assessments		18,545 31
Interest to June 30, 1872		207 27
		$22,370 80
Printing Manual	60 00	
Books and stationery	27 65	
Clerical assistance	150 00	
Miscellaneous	6 35	
Postage and printing	331 56	
Current expenses	$575 56	
Paid heirs of:		
Andrew Ainsworth	970 60	
Charles H. Baker	970 33	
E. A. Hanvey	982 33	
J. T. Elliot	974 33	
R. S. Raymond	989 50	
M. G. Chittle	1,099 50	
R. N. Norton	1,111 50	
D. Blackham	1,113 00	
H. F. Thurber	1,155 00	
J. M. Holdman	1,267 00	
J. R. Dunlap	1,243 00	
F. S. Belden	1,263 00	
W. P. Trites, on acc't	200 00	13,914 65
Balance		$8,456 15
In deposit with Treas. W. U. T. Co.	8,367 15	
Due from agents	21 00	
In hands of Treasurer	68 00	8,456 15

Of the above amount there are due to the heirs of deceased members the following amounts:

T. Wilcox	1,229
E. Wade	1,217
R. S. Fowler	1,230
W. P. Trites	954
J. A. Conley	1,178
	$5,808

Returns from assessment 49	236	
" " 50	212	
" " 51	196	
" " 52	189	
Advance payments on future assessments	90	
		6,731 00
Credited to reserve fund		1,725 15
		$8,456 15

A. S. BROWN, *Treasurer.*

SECRETARY'S REPORT.

Your Secretary respectfully submits the following report for the year ending Nov. 5th, 1873:

Number of deaths	19
Number of new members received	475
Number of certificates canceled on account of deaths, failures to pay assessments, and resignations	251
Number of members in good standing at the beginning of the year	978
Number actually in good standing at date	1,230

Since the organization of our Association there have been a total of 2,151 certificates issued, 921 of which have been canceled.

Early in the year a system of agencies, or as they might, perhaps, be more properly styled, Assistant Secretaries, was inaugurated, followed by the most satisfactory results. Those selected to act were, in most cases, old members who had previously taken much personal interest in the affairs of the Association, and who were the choice of the members in their respective localities. I wish, in this connection, to acknowledge the promptness with which these gentlemen responded to an invitation to act, and for the zeal and fidelity with which the duties pertaining to their office have been discharged.

The agents have been the principal means of not only securing to us large accessions to our membership, but, through their care in approving applications, a better class (as regards physical condition) of new members has been received. This is proved by the fact that the name of only one applicant accepted during the year now appears on the mortuary list. Great care has been taken in accepting new members. In cases where the applicant was not well known to an officer or agent of the Association, or any doubt existed as to his physical condition, a certificate of health from a reputable physician was insisted upon.

Through the efforts of the agents the delinquent list has been kept at its minimum, and notwithstanding the unusual number of deaths during the year, remittances have, in general, been prompt and satisfactory. The loss of valuable letters in the mail, a source of much ill-feeling and vexation up to the beginning of the present year, has almost ceased to be complained of.

The Post-office department has served us well, and I know of no instance, during the year, in which there is reason to think it has been at fault, This is somewhat surprising, when it is considered that we have sent and received upwards of 25,000 letters and circulars through the department. What little trouble has been experienced, I am satisfied is owing to the carelessness of the writers themselves in improperly addressing or stamping their correspondence.

In consequence of the numerous complaints from members whose means were limited, and who could not afford to pay the heavy tax imposed by so many deaths as we have had during the year, it was deemed wise, early in the Summer, to devise some measure to relieve this numerous class.

Two schemes were proposed to accomplish this object; one was to divide the membership into classes of 500 each, designate each class as A, B, and C, and to give a member the option of belonging to one class or all. The other plan, first suggested by the Hon. Wm. Orton, was to limit payments in case of each death to $1,000, the excess paid in on any assessment to be credited to the reserve fund, which, in due time, would be drawn upon to pay a death claim, instead of assessing the members for the same. The first plan was open to the objection that it would involve too much clerical labor, and be too complicated. The second was simple, would cause no additional work in keeping the books, and it was thought that $1,000 was as great a sum as such an institution as ours should undertake to pay at any one time. An expression of opinion of the members in general, on the expediency

of adopting this latter plan, was solicited. Much to the surprise of the officers, it met with considerable opposition, which could only be accounted for on the ground that the proposition was not thoroughly understood, and while, doubtless, a clear majority were in its favor, it was thought best, in deference to the opinions of the minority, to postpone the whole subject until this annual meeting. The association has grown so large, and the labor connected with keeping the books, and corresponding with members, has increased so greatly within the past two years, that some provision should be made for remunerating, in a suitable manner, those upon whom the work shall hereafter fall. The present officers cannot, under any circumstances, serve another year, on account of other duties, and it becomes a serious question to determine what arrangements shall be made for the future.

In view of these important considerations, we are glad to see so many present from points outside of New York, to share in our deliberations for the ensuing year.

D. R. DOWNER, *Secretary*.

On motion, the report of the Secretary was accepted, and placed on file.

Mr. A. S. Brown, from the committee appointed to secure a charter from the Legislature, reported that, on consultation with gentlemen of experience, it was decided to report against any such application, as likely to involve the Association in difficulties which would not be offset by any equivalent advantages.

On motion, the report of the Committee was accepted, and the committee discharged.

Mr. A. S. Brown submitted a new form of Constitution and By-laws, which were discussed *seriatim*, and adopted, as follows:

CONSTITUTION AND BY-LAWS OF THE TELEGRAPHERS' MUTUAL BENEFIT ASSOCIATION.

ART. I.

This Association shall be known as the Telegraphers' Mutual Benefit Association; its object being to aid and benefit the families of deceased members.

ART. II.

Its officers shall consist of a Treasurer and Secretary.

ART. III.

There shall be an Executive Committee of five, composed of the Treasurer, Secretary and three other members of the Association.

BY-LAWS.

RELATING TO MEMBERSHIP.

I.

Any person who is, or who has been, employed in telegraph service, in any capacity, may become a member of this Association upon payment of the required fees, providing such person is acceptable to the Executive Committee.

II.

Any member who has become delinquent through failure to pay assessments, may be restored by a unanimous vote of the Executive Committee, upon filing with the Secretary the proper form of application, and paying back dues, and an additional sum of one dollar and a half.

III.

FEES AND BENEFITS.

The initiation fee shall be one dollar and fifty cents, and in addition thereto a further sum, to be determined in the following manner, to wit: the amount in the reserve fund of the Association shall be divided by the whole number of members at the time of the application, and the quotient less any remaining fraction of a dollar, shall be added to the initiation fee as above.

IV.

Immediately after receiving notice of the death of a member, the Treasurer shall (except as hereinafter provided) assess each remaining member one dollar, payable within thirty days of the issue of the assessment call, neglecting to pay which during the time specified, the delinquent shall forfeit all claims to the benefits of the Association, and shall forfeit membership at the expiration of 60 days, and be restorable only as provided in Section II. of the By-Laws. Upon the death of a member the Treasurer shall, on application from the heirs, pay over to them a sum not exceeding one thousand dollars. If the amount received from the members under the preceding arrangement is not sufficient to meet this demand, the deficiency shall be made good from the reserve fund of the Association, if said fund is sufficient for the purpose, it being the intention to pay to the heirs of all members the exact sum of one thousand dollars.

VI.

Whenever the reserve fund shall be sufficient in amount to pay one or more assessments without reducing the reserve below three thousand dollars, such assessment shall be passed, and the claim of the heirs in such case shall be paid by the Treasurer from this fund. Provided, that when the membership exceeds 2,000, the minimum shall be increased to $6,000, and the Executive Committee may at any time, by a vote of not less than four of its members, order a claim paid from the reserve fund without assessment when the fund is sufficient for the purpose.

VII.

DUTIES OF OFFICERS.

It shall be the duty of the Treasurer to preside at all meetings of the Association, receive all moneys from the Secretary, pay properly audited bills and claims, sign all certificates of membership, and prepare and present a report to the annual meeting.

VIII.

The Secretary shall keep the records of the Association, sign all certificates of membership, maintain such correspondence, and issue such notices as may be necessary. He shall receive all moneys from members, and pay the same to the Treasurer, and present a report at the annual meeting of the Association.

IX.

The Executive Committee shall have general supervision over the affairs of the Association, and decide all questions which may arise.

The Committee will meet at any time at the call of the Treasurer.

X.

MEETINGS, &c.

A meeting for the election of officers and members of the Executive Committee, and the transaction of such other business as shall come before it, shall be held annually on the second Wednesday in November of each year. The officers elected shall serve for one year, or until their successors are elected. In case of the death of a member of the Executive Committee, the remaining members shall have the power to fill the vacancy until the time of the next annual election.

XI.

Special meetings of the Association shall be called upon the written request of twenty-five members.

XII.

The Secretary may appoint, subject to the approval of the Executive Committee, a number of members to act and be known as agents, whose duty it shall be to exercise a general supervision over Association matters in their respective districts.

They shall receive and forward to the Secretary applications for initiation or restoration, with their endorsement of approval, or otherwise, as the case may be, keeping on hand the necessary blank forms, receive payments from members, giving receipts therefor when desired, and remitting to the Secretary all money on hand at the expiration of 30 days from the date of an assessment, advise the Secretary of changes in address of members, and in the event of the death of a member, attend to payment to the heirs, under the direction of the Treasurer and Secretary.

XIII.

The books of the Association shall always be open to the inspection of any member thereof.

XIV.

The Secretary shall receive compensation for the performance of his duties at the rate of five hundred dollars per annum.

XV.

All expenses of this Association, including the pay of its officers, shall be paid from the reserve fund of this Association.

XVI.

The *status* of all persons connected with the Telegraphers' Mutual Life Insurance Association is maintained under this Constitution and By-Laws.

ELECTION OF OFFICERS.

Mr. Wm. Holmes, of the Tariff Bureau, was unanimously elected Secretary of the Association for the ensuing year, and J. D. Reid, Treasurer. A vote of thanks to the former officers for their faithfulness and zeal for the past year was passed, and the meeting adjourned at a late hour.

The "foreign" delegates were:

F. A. Armstrong, Cincinnati, O.; H. A. Clute, Harrisburg, Pa.; James Merrihew, Philadelphia, Pa.; Frank Morrison, Baltimore, Md.; M. Marean, Washington, D. C; G. B. Hubbell, Hartford, Conn.; W. J. Denver, Springfield, Mass.; E. A. Beardslee, Boston, Mass.; Geo. A. King, Albany, N. Y.; D. L. Pike, Syracuse, N. Y.; J. W. Tillinghast, Buffalo, N. Y.; R. O'Brien, Scranton, Pa.; A. J. Reinhold, Mott Haven, N. Y.; John Fuller, Easton, Pa.; C. W. Schermerhorn, Plainfield, N. J.; C. W. Gulick, Plainfield, N. J.; D. C. Hinsdale, Indianopolis.

On motion it was

Resolved, That all who have been members of the Telegraphers' Mutual Life Insurance Association, and are delinquent through non-payment of dues to an amount exceeding $10, may, with the approval of the Executive Committee, renew their membership in this Association on the payment of that sum; this resolution to remain in force till Jan. 1st, 1874.

It may be as well to add that the operation of By-Law 3 is to make the initiation fee of applicants in the present state of the reserved fund, one dollar more than the ordinary admission. This is entirely fair, the present membership having, by their payments, accumulated the present reserved fund. *Remit money only to William Holmes, Sec.*

GEORGE DAFT, telegraph operator, was instantly killed on Sunday morning last at Fulton station, on the Baltimore and Potomac Railroad, by jumping from a train while in motion. He bore an excellent character.

We neglected to note, in our last, the death of C. A. McDaniel, acting Manager at Colvert, Texas, and his wife, Oct. 13th; and of Taylor Adams, operator at New Orleans, on the 16th ult.—all of yellow fever.

DEATH OF TELEGRAPHIC MANAGER T. R. TERRY.

COLUMBUS, GA., Oct. 21st.

Mr. Thomas R. Terry, manager of the Southern and Atlantic Telegraph Company at Montgomery, died of yellow fever this morning at 2:30 o'clock, at the residence of his father-in-law, at Mitchell Station, on the M. and E. R. R. He was a native of Virginia, and about thirty years of age. He leaves a lovely wife and a sweet little girl to mourn their irreparable loss. Not a nobler man could be found in any walk of life. He was a reliable man, esteemed by everybody that knew him. He leaves numerous friends to mourn his untimely death.

THE DEATH OF CORNELIUS McCARTHY.

At a meeting of the employés of the Western Union Telegraph Company to commemorate the memory of our departed and esteemed associate, Cornelius McCarthy, the following preamble and resolutions were adopted, viz:

"*Whereas*, we are called together to mourn the loss of our esteemed associate, Cornelius McCarthy, by death; therefore,

Resolved, That we deeply mourn the loss of our associate, combining as he did the elements of a true man while living, and who leaves for us a practical and noble example.

Resolved, That to his family and relatives we tender our heartfelt sympathy and condolence.

Resolved, That we wear the usual badge of mourning for thirty days, and that a copy of these proceedings be furnished his family and relatives, and that the same be published in the Memphis city papers and the telegraph journals.

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TELEGRAPH COMPANIES.

THEIR RIGHTS IN CITIES—OPINION OF THE COUNSEL TO THE CORPORATION.

Telegraph companies incorporated under the laws of the State of New York are legally authorized to extend their wires in the usual manner through the streets of the City of New York.

The right of the Common Council of that City to regulate the erection of telegraph poles, and the duty of the Commissioner of Public Works to remove obstructions, do not empower those authorities to substantially abridge or materially interfere with the right of such companies to construct their lines in any street or avenue.

LAW DEPARTMENT,
OFFICE OF THE COUNSEL TO THE CORPORATION,
NEW YORK, Oct. 25, 1873.

Hon. George M. Van Nort, Commissioner of Public Works:

SIR: A communication from your department requests my opinion upon the legal right claimed by telegraph companies to extend their lines through the streets of the City of New York.

The place and progress of the telegraph in modern civilization have been so recent and rapid that those few persons who do not directly participate in its benefits may be pardoned for overlooking its usefulness and necessity, when, like all public improvements, it causes inconveniences to localities and to individuals. In populous communities its obstructions are, of course, the most felt; while it is precisely there that its works are the most needed. It is frequently objected that the prevailing system of carrying the wires upon poles should give way to some plan of subterranean communication. No such change has been found anywhere practicable, at least to any general extent; and in our American cities, which are all, even including New York, in a conspicuously unfinished state, it is difficult to see how wires could be so laid in the earth as not to be daily interfered with by excavations required in the erection and alteration of buildings. Interruptions to the continuity of the lines would also result, though to a less extent, if carried, as some propose, over the tops of buildings. It is known, however, that large sums have been expended by leading companies in obtaining plans for some system less objectionable than the present, in point both of convenience and sightliness. It would require the expenditure of millions of dollars to effect any general change. Both public opinion and the interests of the companies themselves will undoubtedly require the outlay of the money when practicable plans shall have been discovered and invented; but even when that time shall have arrived, it cannot be expected that reconstructions of such magnitude and changes so extensive can be the work of a day.

The Constitution of the United States clothes Congress with the express power of regulating commerce with foreign nations, and among the several States. (Article 1, section 8, subdivision 4.)

In 1866 Congress passed a statute, entitled "An Act to aid in the construction of telegraph lines, and to secure to the Government the use of the same for postal, military, and other purposes." That Act gave to any telegraph company then organized or thereafter to be organized under the laws of any State in the Union, the right to construct, maintain, and operate lines of telegraph through and over any portion of the public domain, over and along any of the military or post roads which had been or might thereafter be declared such by Act of Congress, and over, under, or across the navigable streams or waters of the United States; provided only that navigation should not be obstructed nor ordinary travel be interfered with. Materials for such construction may, under that Act, be taken from the public lands. Dispatches for the Government are to have priority of transmission. The United States may purchase the telegraph lines. (United States Statutes at Large, volume 14, chapter 230, page 221.)

As early as the year 1848 the Legislature of this State enacted a statute for the incorporation and regulation of telegraph companies. By section 5 any telegraphic association is authorized to construct lines of telegraph along and upon any of the public roads and highways, by the erection of the necessary fixtures, including posts for sustaining the wires; provided such construction does not incommode the public use of such roads or highways. By section 6, if any person upon whose lands such posts should be placed, consider himself aggrieved or damaged, he may apply to a County Court to appoint five disinterested persons as commissioners to make a just and equitable appraisal of the damage, and the amount thereof shall be paid by the company. Section 7 enacts that any person who shall intentionally injure, molest, or destroy any telegraphic line or post shall be guilty of a misdemeanor, and be punished by a fine not exceeding $500, or imprisonment in the county jail not exceeding one year, or both, at the discretion of the Court. The provisions of law, of which the substance is given above, will be found in chapter 265, of the laws of 1848, page 392.

In 1853 that Act was amended. By section 2 of the amendatory Act any telegraphic association is authorized to erect and construct from time to time the necessary fixtures for lines of telegraph upon, over, and under any of the public roads, streets, and highways, and also to erect and construct such fixtures upon, through, and over any private lands, subject in the last instance to the right of the owner to full compensation to be agreed upon, or, in the event of a failure to agree, a Court to appoint a disinterested commission to appraise and fix a sum in gross as the compensation which the proprietor is to receive from the company. This amendatory Act forms chapter 471 of the laws of 1853, page 931. It must be observed that these Acts contain no condition clothing local authorities with any power, direction, or supervision in the matter. Nor is there any restriction in the application of the two statutes to all parts of the State. It is clear, therefore, that the answer to your first inquiry must affirm the right of telegraph companies, incorporated under the laws of this State, to erect poles in the City and County of New York.

Your second question is, whether these companies must first obtain the consent of the Common Council before they can legally erect poles in this City? My answer must be in the negative. The right conferred upon them is absolute and unconditional. The statutes upon this subject proceed upon the broad ground that the telegraph is an institution necessary to the public good and the convenience of the people at large. To permit the Common Council of a city to prohibit the construction of the fixtures necessary to traverse its streets with a telegraph, would be to clothe a local authority with power to obstruct a great and general public necessity by its own mere will for reasons of mistaken local advantage, or even from mere caprice.

It is true that among the powers granted to the Common Council of New York, by what is known as the Charter of 1873, is the right to regulate the use of the streets and sidewalks for signs and sign-posts, awnings and awning-posts, horse-troughs, telegraph-posts, and other purposes. (Subdivision 9, of section 17, chapter 335, of the laws of 1873.)

This general provision of law contains no implication that a telegraph corporation of this State must obtain the consent of the Common Council to exercise the right legally conferred of erecting poles in the City; nor can the Common Council lawfully act upon the supposition that the power of regulation can be so used as in any way to obstruct or abridge the comprehensive right to place telegraph poles through the public streets. The power of regulation is a power to direct that the erection of the poles shall be done in an orderly manner, with no unreasonable interference with the ordinary uses of the streets, and with no gross and exceptional disfigurement. But as the law itself does not restrict the companies to the use of any particular street, but permits them to carry their fixtures through any of the streets of the City without exception, the Common Council, under the right of regulation, cannot deprive the companies of the full measure of power which the Legislature, for public reasons, has seen fit to confer upon them. Their permission come from the law-making power of the State, and it need not be sustained, nor can it be limited by the action of local authorities.

Your third inquiry is, Can the Commissioner of Public Works authorize the erection of telegraph poles in the City of New York? As such erection is already permitted by law, the right to exercise it is not left to the discretion of either the Executive or Legislative departments of our local government. The powers of the Department of Public Works are broad, and they expressly include the keeping of the streets clear of obstructions. This reasonably implies such power of regulating the use of the streets by a telegraph company, as we have already considered, as also in general terms conferred upon the Common Council; but it does not impose upon the companies the necessity of obtaining from any department of the City Government a permission to use the streets in accordance with the powers conferred by the Legislature. When, however, a telegraph company is about to erect its poles in a street or avenue, the Commissioner may properly issue a permit as evidence in the hands of the company's superintendent that the necessary obstructions are lawful, and your department should so far regulate and oversee the work as to secure public and private interests against unnecessary interference.

As a general rule, there ought in reason to be no conflict between the local authorities of cities and the directors of great public works and improvements. The growth and prosperity of towns, the profitable use of their capital and the interests of their population, including regular employment to labor, must always be promoted by the utmost facilities of traffic, transit and communication. This obvious truth is always acted upon by young communities, but is often fergotten when cities have long grown and prospered. Under proper safeguards, railroads cannot come too near nor penetrate too far. To maintain its commercial pre-eminence, New York must encourage and foster these public enterprises which bring it near to the remotest quarters of the country and the world. In the words of Sir Walter Raleigh, "all those things that cause the greatness of a city are also fit to conserve the same."

I am, sir, very respectfully yours,

E. DELAFIELD SMITH,
Counsel to the Corporation.

THE telegraphic receipts on European and Asiatic business are reported as largely increased in comparison with last year.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY,

SEPTEMBER, 1873.

APPOINTMENTS.

W. H. Egan, 145 Broadway.
E. W. Emery, "
J. C. Graham, "
C. N. Howlett, "
J. J. McDermott, "
L. F. Miller, "
F. H. Patrick, "
J. Rankin, "
H. M. Rulison, Jr., "
E. F. Welsh, "
Miss V. Enwright, "
W. A. Brower, St. Nich. Hotel.
Miss A. Bulton, Everett House.
P. H. Dunn, St. Nicholas Hotel.
Miss K. Doubleday, Astor Pl.
Geo. Keating, Cot'n Exchange.
W. G. Mosier, Windsor Hotel.
E. D. Sheehan, Cotton Exege.
Fred Wilcox, Brooklyn, N. Y.
W. Brown, Ellershouse, N. S.
A. E. Clarke, Pt. Duchene, N.S.
T. H. Taylor, Gt. Village, N. S.
Miss B. Eaton, Liverpool, N. S.
Mrs. W. W. Wood, Boston, Mass.
Miss I. Spencer, Boston, Mass.
Miss Isa Orcutt, " "
W. B. Wilde, " "
J. B. Phillips, " "
Jno. Fallon, " "
E. E. Long, Cohasset Narrows, Mass.
W. W. Low, Dedham, Mass.
Miss L. Hubbard, Fair Haven, Conn.
Miss M. T. Greene, Kingston, R. I.
L. R. Hall, Meridian, Ct.
E. O. Chase, Newport, R. I.
W. Hamilton, "
Miss Kate Howe, Palmer, Mass.
Miss A. S. Moury, So. Framingham.
J. W. Wait, Spencer, Mass.
Miss S. M. Pearson, Thompsonville.
Miss E. S. Lyon, Westbrook, Conn.
J. P. Cassidy, Altamont, Md.
S. Wheeler, Davenport, Ia.
F. Merrill, Milwaukee, Wis.
R. McOuld, Milwaukee, Wis.
F. R. Riddle, McGregor, Ia.
C. H. Grey, Springfield, Ill.
G. Gardinler, Sioux City, Ia.
J. J. Wirt, Waterloo, Ia.
H. Miles, Chicago, Ill.
H. Stanberry, " "
H. C. Burton " "
A. J. Fox, " "
L. B. Bobo, " "
A. J. Merriness, " "
C. M. Cunningham, Chicago, Ill.
F. W. Farley, " "
E. T. Bloomhoff, " "
M. T. Smith, " "
O. H. Lincoln, " "
D. M. Carman, " "
G. D. Richardson, " "
E. P. Delano, " "
G. F. Stewart, " "
J. E. Riley, " "
Thos. Langdon, " "
F. Schnell, " "
Wm. Wallace, " "
Geo. Tatze, " "
B. T. Grandin, Chicago, Ill.
Geo. Baker, " "
B. Grady, " "
G. L. Thompson, " "
C. Pillsbury, " "
C. G. Pearson, " "
Miss E. M. Marsh, Au Sable, M.
W. Prescott, Cleveland, O.
W. O'Connor, " "
F. A. Stumra, " "
Miss N. Briggs, Detroit, Mich.
G. McMahon, E. Saginaw, "
J. H. Aul, Grand Haven, "
S. J. Kelley, G'd Rapids, "
A. Molliter, Rogers City, "
F. G. Brown, So. Bend, Ind.
Miss C. Washburn, Saginaw City, Mich.
W. P. Thompson, Sault Ste. Marie.
E. P. Wilson, Toledo, O.
J. W. Stearn, Warren, Pa.
J. Houston, Sup't. L. L. & G. R.
T. H. Lawrence, Sup't. A. & NR
C. E. Smalls, Atchison, Ks.
J. A. McDonald, Kansas City.
R. G. Fox, "
J. Magill, "
M. J. Carman, Lincoln, Neb.
G. W. Young, Flemington, W. Va.
J. B. Baldridge, Grafton, W. Va.
J. M. Marquette, Harpers Ferry, W. Va.
W. E. Barnett, Baltimore, Md.
F. Iago, " "
J. C. Shaffer, " "
W. P. Miller, Rogers Ford, Pa.
R. H. Schoner, Bethlehem, Pa.
S. S. Schultz, Tower City, "
J. P. Beers, Troy, "
F. Pieferstein, Tyrone, "
E. S. Ely, Wilkesbarre, "
J. W. Collings, " "
J. H. Heany, Auburn, N. Y.
P. Haley, Niagara Falls, "
T. R. Hudson, " "
W. F. Butler, Rochester, "
Miss N. A. Flint, Tonawanda.
L. W. Ballon, Providence, R. I.
F. B. Livingston, Burlington, Vt.
W. R. Armstrong, Grouts Corner, Mass.
R. Labarre, Hartland, Ct.
E. A. Silsby, White River Junc., Vt.
M. A. Feeny, Albany, N. Y.
C. E. Arnold, " "
Miss E. Lawrence, Hudson, "
Miss M. C. Joseph, Peekskill, N. Y.
F. A. Wales, Po'keepsie, N. Y.
Miss Lena Townsend, Poughkeepsie, N. Y.
S. W. Ford, Troy, N. Y.
E. B. Duffey, " "
Miss M. C. Saulsbury, Troy,
T. J. Nicholson, Sandy Hill, N. Y.
A. C. Haley, No. Pownal, Vt.
C. D. Andrews, St. Joseph, Mo.
C. H. White, St. Louis, Mo.
T. P. Wheeler, " "
L. De Lindsay, " "
J. H. Cummings, " "
E. W. Applegate, " "
M. Hollahan, " "
H. C. Craig, Fagundus, Pa.
L. A. Langworthy, Millerstown, Pa.
G. F. Lovell, Millerstown, Pa.
W. E. Siggins, " "
Frank Ross, Oil City, Pa.
W. A. Irvin, Parker's Ldg., Pa.
C. M. Tobias, " "
W. B. Ogden, Titusville, Pa.
L. D. Stanley, Indian'polis, Ind.
J. V. Crowe, " "
Miss C. Whitson, " "
T. L. Downast, " "
L. M. Barnard, " "
S. P. Grant, Jeffersonville, Ind.
E. C. Green, Lafayette, Ind.
W. H. Glass, Urbana, O.
L. S. Eddy, Cincinnati, O.
J. M. Spencer, "
W. C. Gurley, "
J. D. Walker, "
T. P. Kehrer, Ironton, O.
J. F. Singleton, Vincennes, Md.
W. J. Lewis, " "
E. Boutelle, Colorado Spgs., Col.
J. S. L. Reynolds, Evans, Col.
J. Lewis, Maniton, Col.
N. Sequa, Trinidad, Col.
J. W. Burruss, Raleigh, N. C.
C. R. Pettis, Altus, Va.
B. W. Lee, Henderson, N. C.
E. J. Hanson, Va.
T. J. Concannon, Wilmington, N. C.
G. W. Dwells, Millen, Ga.
J. R. Graves, Brainbridge, Ga.
L. B. Pennington, Marion, Ga.
Miss F. Waldron, Savannah, Ga.
W. O. Ahl, Blackshear, Ga.
Jas. Murray, Wetumpka, Ala.
H. M. Smith, Sugar Valley, Ga.
C. D. Thompson, Childersburg, Ala.
E. C. Heard, Loochapoka, Ala.
S. G. Olliver, Auburn, Ala.
S. R. Perryman, Whistler, Ala.
P. K. Garner, Shubata, Miss.
C. F. Barnes, Pensacola Junct., Ala.
S. A. Oliver, Hampton, Ga.
A. O. Osborne, Jonesboro, Ga.
D. Saffold, Jamelsons, Ala.
G. Pierce, Milners, Ala.
C. R. Cole, Auburn, Ky.
B. M. Poynter, Bradford, Tenn.
H. A. Perkins, Burnsville, Miss.
N. W. Yelton, Carlisle, Ky.
U. S. Albitz, Danville, Tenn.
T. B. Killing, Louisville, Ky.
E. A. Buckner, " "
E. Coleman, " "
J. H. Wheatley, Lynnville, Ten.
J. W. Rust, Memphis, Tenn.
H. St. E. Austin, Nashville, Ten.
L. B. McCullen, Troy, Tenn.
A. A. Bright, Union City.
C. H. Ketcham, Worthville.
C. C. Reynolds, Sp'gfield, Tenn.
A. Sayville, Shreveport, La.
H. C. Davis, " "
W. Bernard, " "
B. L. Smity, " "
Miss Bella Best, Baltimore, Md.
J. T. Grasty, " "
R. B. Smeetzer, " "
A. Fisher, Jr., Cambridge.
J. Hendrickson, Cattaraugus.
G. Catherman, Canton.
J. Kennedy, Deal, N. J.
Geo. Raymon, Dover, N. J.
J. P. Borden, Elizabeth, "
J. S. Treim, Harrisburgh, Pa.
W. D. Tyler, Minnequa, "
D. Finchs, Newark, N. J.
A. Offutt, Penningtonville, Pa.
E. L. Filbert, Pine Grove, "
J. Richards, Pottsville, "
Jos. Ross, " "
J. B. Smith, Phœnixville, "
J. T. Anderson, Philadelphia.
Saml. Bracken, "
H. A. Wells, "
Miss E. Rider, Meriden, Conn.
T. J. Logan, Shreveport. La.
M. L. Mynotte, Jacksonport, Ark.
J. L. Buchannon, Minden, La.
M. M. Bond, Marshall, Tex.
E. J. Smith, Red River City, Tex.
L. G. Lurn, Clear Creek, "
M. H. Morris, Austin, "
J. W. Wckard, Minneola, "
G. A. Lamb, Brandon, Miss.
G. H. Adis, Chefmenteur, La.
W. H. Crenshaw, Garner, Miss.
J. W. Ferriss, Hammond, La.
E. S. Ayers, New Orleans, La.
G. W. Irvin, " "
R. G. Raone, Osyka, Miss.
W. P. Hubbard, Popes, Miss.
E. L. Custiss, Vaughns, "
H. F. Lawrence, Wests, "
W. M. Redding, Winona, "

RESIGNATIONS.

The resignations number 208, which we are compelled to omit.

TRANSFERS.

Name.	*From.*	*To.*
S. L. Amies	Long Branch	Cotton Exchange.
Miss M. Brittain	Huntington, L. I.	So. Brooklyn, L. I.
A. D. V. Brown	So. Brooklyn, L. I.	325 Washington St.
J. G. Ballard	Long Branch	134 Pearl St.
P. J. Casey	"	Relief, New York.
J. Corcoran	Saratoga	145 Broadway.
Miss Mary Du Bois	Grand Street	"
J. H. Dwight	145 Broadway	Albany, N. Y.
B. C. Edwards	St. Nicholas Hotel	Park Place.
E. J. Fullum	Saratoga	145 Broadway.
Wm. Grevers	Long Branch	516 "
Miss F. Hurst	145 Broadway	Peekskill, N. Y.
W. W. Hart	Park Place	Earle's Hotel.
D. Harmon, Jr.	Saratoga	145 Broadway.
L. Kirschbaum	Long Branch	21 Wall St.
Miss C. Merchant	145 Broadway	Stevens House.
Miss Mary E. Mott	Oyster Bay, L. I.	Dry Dock.
J. W. North	Thirtieth Street	Allerton's.
Miss Frank Pike	Flatbush	145 Broadway.
W. J. Quinn	145 Broadway	"
C. T. Raymand	Earle's Hotel	"
Lillie Spear	Everett House	Oyster Bay, L. I.
J. Sitzenstatter	21 Wall St.	134 Pearl St.
Lizzie Strachan	Astor Place	Flatbush, L. I.
J. H. Sunny	Cotton Exchange	Claflin's.
F. G. Brown	Cleveland, O.	So. Bend, Ind.
James Hall	Detroit, Mich.	G. Haven.
M. Cowie	Liverpool, N. S.	Lockport, N. S.
Miss A. S. Mowry	Boston, Mass.	S. Framinghm, Mas.
J. H. Rhodes	Lafayette, Ind.	Urbana.
R. D. Fisher	Altamont, W. Va.	Salem, W. Va.
A. C. Preble	Portland, Me.	Boston, Mass.
J. A. Hartman	Atlantic City, N. J.	Philadelphia.
F. L. Wheaton	Baltimore, Md.	Annapolis, Md.
H. S. Scholte	Cape May, N. J.	Philadelphia.
J. P. Beers	Minnequa	Troy, N. Y.
J. S. Anderson	Ocean Grove, N. J.	Philadelphia.
J. J. Monroe	Wilkesbarre, Pa.	Philadelphia.
C. G. Woodsworth	Auburn, N. Y.	Utica, N. Y.
W. J. Coy	Niagara Falls, N. Y.	Syracuse, N. Y.
C. T. Miner	Colorado Spgs., Col.	Central City, Col.
G. C. Burch	Millen, Ga.	Sumter, S. C.
B. F. Dillon	Augusta, Ga.	Savannah, Ga.
C. H. Williams	Savannah, Ga.	Waynesboro, Ga.
C. J. Abbott	White River Jc., Vt.	Manchester, N. H.
H. C. Davis	New Orleans, La.	Shreveport, La.

NOTES AND QUERIES.

COLDWATER, Mich.—A message originating at a point where there are both W. U. and A. & P. offices, is destined to a point where there is no A. & P. office; is started by A. & P., comes part way, and is handed to our company, to be sent through. Message requires an answer. Party answering does not want to guarantee the collection of tolls. Should it be received, and if received, should it be sent *via* the same route by which it came, or direct *via* W. U. line? If by W. U., and the office at the end of route is unable to find the party, and hence unable to collect toll, is the manager held responsible for the amount of check?

Ans.—Answer under such circumstances should not be accepted unless guaranteed, and should be transmitted wholly by Western Union line.

EASTHAMPTON, Mass.—Please explain, through the columns of the JOURNAL, how many words in the following signature, "Williston Mills, E. H. Sawyer, Treasurer." I claim, according to Rule 9, "Whenever more than one signature is attached to a message, count all except the last, as a part of the body of the message," and the word Treasurer after the signatures, that there are three words in it. By explaining you will greatly oblige.

Ans.—You are correct.

ENQUIRER.—In case an operator at a repeating station is requested to take and repeat a message, as (D. H., no account), should he comply with the request, or should he insist that it must be checked with number of words and reason why D. H., as per rule?

Ans.—When a message has been accepted in good faith and started on its way, a repeating office is required to receive and transmit it, as if in all respects regular. We refer Enquirer to Rule 20, second clause.

J. E. BROWN, Manager, Braceville, Ohio.—Ravenna, Ohio, is 17 miles from here. Tariff Circular taking effect July 1st, 1873, makes tariff 25 cents for less than 25 miles, yet Ravenna, O., is in square 159, and that is 40 cents. There are several other offices in the same fix. Please state whether I am to use distance rate or square rate in such cases?

Ans.—Use "distance" or local rates to all points within 50 miles of your office. The 40c. rate to square 159 is given for the reason that there may be two—perhaps more—offices in that square more than 50 miles apart.

HAMBURG, Iowa.—I find in JOURNALS December 2nd, 1872, and September 15th, 1873, a flat contradiction in regard to counting St. James. Now, is not any name with St. prefixed a surname, and always to be counted as one word, no matter what they may be prefixed to, whether hotels, steamboats, stations, or anything else? Please decide for us and oblige.

Ans.—We believe the answer given December 2, 1872, to be the correct one. If St. James is a surname (and it is well known to be so), then it is one word, and only one, wherever it is used. It is, therefore, as much one in naming a hotel as in the name of a person.

BLACK HAWK, Col.—Quite frequently I hear red messages passing to points out here, and originating (almost invariably) at large offices in the "States." Would it not prevent some errors, and Managers from losing on them, to define through the JOURNAL (again) the limits of half-rate territory?

Ans.—The rate in reference to red messages is as follows: "Half-rate messages may be taken for and received from offices in United States in squares from 6 to 511 inclusive, and 587." No red messages can be taken for places beyond Kansas and Nebraska.

A communication from Warsaw is too blindly and carelessly written for our comprehension.

WE acknowledge receipt of a communication, three folios in length, ending in a "birth" notice, and perpetrated on Form 271, St. Louis, Kansas City and Northern Railway, signed "Opperators." It proves the existence of a candidate for the insane asylum in that district. The advent of the baby may account for it, and we forgive it for that reason only.

JOHN J. FLANAGAN, of the *Utica Observer*, President of the St. John's Temperance Society, and widely and well known in telegraphic circles, has been presented with an elegant gold watch and chain by the members of the society. It was a very deserved honor to a most worthy man.

We acknowledge corrected lists of offices from the following, thanking all for their promptitude:

Pacific Division.
Central Division, 4th, 6th and 7th.
Eastern Division, 2d, 3d, 5th, 7th and 9th.
Southern Division, 4th.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, NOVEMBER 15, 1873.

SHREVEPORT.

The correspondence growing out of the recent deaths from yellow fever at Shreveport, La., has been placed in our hands. We have read it in tears. There are passages in these letters bursting with the bitterness of sorrow. There are also the evidences of a heroism of which the Company may well be proud, and which has been deeply and fully appreciated. The correspondence is scarcely suitable for publication, yet we make exception in the case of the admirable letter of Superintendent L. C. Baker, which will be found elsewhere. Let no one fail to read it. There is a tenderness throughout which is an honor to him. In fact, this permeates the whole correspondence. The executive letters are touchingly parental and tender. They are fresh evidences of what we have always gloried in, an authority not only approachable but sympathetic. Dr. Green's closing words, in his letter of official condolence with the mother of the noble Jackson, is but a specimen of it all. "Your letter to Supt. Baker has touched the hearts of all in our Executive Management, and you have our tenderest sympathy in your sad affliction. We had been thoroughly advised of the noble character of your lamented son, and his bright promise of honor and usefulness to his family, his friends and the world. May God help you to bear your cross with Christian submission, and provide you friends and comfort to your 'heart filled with sorrow,' and bright cheer to your sad 'home,' now made 'desolate.'" A committee has been appointed to assist the bereaved families.

We add a word of our old friend Saville. Says Mr. Bernard, now manager at Shreveport: "I must tell you of poor, self-sacrificing Alfred Saville. During the time he was with us not a word of impatience escaped him. Forbearing and kind to all who came to him for assistance, he won all hearts. When stricken down, he was a quiet, patient sufferer. Just before death he received a message from his wife, from Grenada, Miss. After it was read to him he said, 'I want for nothing now. I am near Heaven.' All was done to save him, but it could not be. He sleeps his last sleep. No better epitaph could be written for him than our Saviour's words, 'Greater love hath no man than this, that he lay down his life for his friends.'"

We must add the heart-broken language of the mother of Thomas M. Jackson: "My darling boy has sacrificed his life to his sense of duty. The world may applaud, but my heart is filled with sorrow. My home is desolate. My dear child, who loved us so dearly, and was so dearly beloved by us, is gone. Our brightest hopes lie buried in the grave." This noble lad was only seventeen years of age. His father had fallen in battle. He was the hope and support of his mother's home.

We trust that some day a fitting monument may mark the place where rest these heroic men. Meantime, we may use the language of Byron to Kirk White:

> "No marble marks thy couch of lowly sleep,
> But living statues there are seen to weep.
> Affliction's semblance bends not o'er thy tomb;
> Affliction's self deplores thy youthful doom."

In an address recently made in England, the speaker, alluding to the intimacy yearly increasing between the telegraph and other industries and inventions, claimed, very properly, that the range of enquiry by telegraphic workers must also be widened. Nothing could be more sensible. The great highway of the world's thoughts and activities touches all the cross roads of human interest. It may truly say, "whatever concerns man concerns me." It is already harnessed to every storm. It outlines every railroad. It feeds and animates the press. It is the right hand of peace and the necessity of war. It touches all things.

The Postmaster-General will of course introduce into his annual report the subject of the postal telegraph. We would not stop him in doing this if we could. It is well that Congress should discuss every measure where public benefit seems likely to be affected. No company can long defeat the provision of what is intelligently found to be a public necessity. Of course we deny that the tele graph in Government hands can be anything but a public evil. But we do not discuss that now. We wish, however, to say a word on a subject connected with it which some may appreciate.

We have claimed, in another article, that the confidential nature of the business tends to create a sentiment of honor among telegraph men. We emphasize that statement and make another. We believe that the contact of the public with the receivers and managers of offices, and the necessity of courtesy in the transaction of business with them on the part of these receivers, establishes a relationship of mutual helpfulness which must to a large extent disappear as soon as these men become, if they ever do become, governmental employees. Even the same men will meet the public on a totally different basis. Now a man feels that he retains office somewhat on the public estimate of his fitness and desire to oblige. The public can readily reach his employer. He is in a manner in the employ of the public. As a Government official he will become the simple wheel of a machine, grinding out his daily duty, and, independent of the public good-will, will cease to exert himself to merit it. Such, we believe, to be the drift of official service. It is the drift of human nature. Where responsibility ceases, indifference begins. The public cannot afford the change.

The annual meeting of the Telegraphers' Mutual Benefit Association, held Nov. 5th, was a very spirited affair, and was largely attended. Among the "foreign" delegates were F. A. Armstrong, of Cincinnati; D. C. Hinsdale, of Indianapolis; Jas. Merrihew, of Philadelphia; M. Marien, of Washington; R. O'Brien, of Scranton, Pa.; D. L. Pike, of Syracuse, N. Y.; E. C. King, of Albany, N. Y.; E. A. Beardslee, of Boston; C. H. Schermerhorn and —— Gulick, of Plainfield, N. J.; Supt. H. A. Clute, of Harrisburg; W. J. Denver, of Springfield, Mass.; A. J. Reinhold, of Motthaven; John Fuller, of Easton, Pa.; G. B. Hubbell, of Hartford, Conn.; J. W. Tillinghast, of Buffalo; James F. Morrison, of Baltimore. It was the first thoroughly represented and enthusiastic meeting of the organization. President Orton was present during the evening, taking a free and cheerful part in the discussions, and was heartily welcomed. It was observable that his presence in no way interfered with the freedom of discussion, but seemed to give it zest and point. A large amount of business was done, and in a way highly creditable to the intelligence of all concerned. We venture to say that in very few organized bodies could a Constitution and By-Laws, thoroughly remodeled and sharp and specific in their details, have been as fully canvassed, trimmed, and adopted in a single session of three hours. The meeting owed much of its intelligent direction to the foreign delegates, among whom we may be allowed to instance Armstrong, of Cincinnati, and Hinsdale, of Indianapolis; and was kept lively by the sprightliness and bonhommie of Morrison, of Baltimore. We congratulate the Association, also, on the election of Mr. William Holmes, of the Tariff Bureau of the W. U. Telegraph Company to the office of Secretary. No better selection could have been made, although the refusal to accept election by Mr. David R. Downer, who has, during these six years, performed so conspicuous labor for the Association, and to whom it is very largely indebted for its existence and success, gave general regret. We are glad, however, that both Mr. Downer, and Mr. A. S. Brown, to whose clear and practical minds the new order of things is due, and Mr. A. B. Chandler, the accomplished Superintendent of the 5th District, are retained as the Executive Committee.

We bespeak for this worthy organization, called into being as it was by a desire to take from death some of its darkness and provide for the bereaved, a larger and wider welcome and participation. Its membership should be much enlarged. Its history has been one of continued blessing. Its payments during the past year have exceeded $22,000. During the last six years it has entered nearly fifty homes, carrying cheer and hope. We trust its future may be even more successful than its past.

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THE USE OF POSTAL CARDS.

We beg to call special attention to the fact that a postal card can only be used a second time by affixing a three cent stamp thereon. It ceases to be a postal card after its first use. This is official. If it it a convenience to place the answer on the same card, it should be returned in a three cent envelope or a three cent stamp put on its face. Parties returning postal cards with a one cent stamp thereon, are informed that they expose the receiver to double postage. From information before us, it is done to a large extent in the company's service.

WE call attention to another evil. Managers and operators are aware of the fact that letters and papers are frequently lost for the reason that the name of the office to which they are directed may not be the name of their post office. In order that future difficulty may be prevented, managers are requested to send their post office address, if different from the name of their office, to the Tariff Bureau for publication.

Mr. STEARNS informs us that the Duplex is working successfully between London and Dublin, a distance of about 400 miles, 70 of which is cable and six underground, with no repeaters.

Thanksgiving day is coming. It seems a blessed thing that turkeys cannot read and don't understand English. A turkey is a wondrously grave creature to be the expression of thanksgiving. And yet the gloomy bird seems to be the universally accepted medium of gratitude. This may be why he looks so solemn and gives these lugubrious angry gobblings as he struts with melancholy tread through the barn yard. Who knows but that gobble is the turkish of "alas, to what base uses must we come at last!" for to be gobbled up by universal proclamation must seem exceeding base to a turkey of the period. How Henry Bergh can have the face to hand his plate for a second joint on Nov. 27th, we cannot imagine.

Well, the turkey is supposedly slain and the cranberries picked. We hope all our 10,000 readers may have a well-heaped dish of each. Eat both with grateful hearts. The year has been full of mercies to you. Give the day to looking at the credit side of your last year's journal. Hasn't the sun shone for you more than half the year? Are you not proud of your connection with a pursuit which civilizes and unites and blesses the world? Is it not a good thing to have daily duties which increase one's self respect and quicken the sense of honor? Is it not a source of gratitude that in so vast a business the executive influence is kind and humanly and sympathetic, and that there is no harsh band of authority crushing out genius and stifling honest endeavor. Of this there is no better evidence than the existence of the JOURNAL. The poorest boy that runs his errand with a message may write for it, if he writes intelligently, and have a place. Like a smile it leaves the executive walls and enters wherever a click of magnet o'er all this broad continent says "come in." We trust the day may come cloudless to all. We hope also that while you eat your turkey you will remember those who are chickenless, and mark out for yourselves a year of brighter work and more widened sympathy.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Nov. 6th, 1873.

On December 1st, Money Order offices will be established at the following named points:

In G. T. Williams' District:

Washington C. H., Fayette Co., Ohio; Washington, Davies Co., Ind.; Aurora, Ind.; Olney, Ill.

In C. O. Rowe's District:

Greensbury, Pa.

Plainfield, N. J., in D. H. Bates' district, has been closed as a money order office.

G. H. MUMFORD,
Vice-President.

SAN DIEGO has been reached by telegraph.

STUDENTS will be interested in reading Partrick, Bunnell & Co.'s advertisement on the following page.

THE *N. Y. Times* is publishing a serial, based upon ancient mythology, entitled "The New Cable."

PHOTOGRAPHS of the new Western Union building, New York, 25 cents. Address John Brant, 145 Broadway, N. Y.

Two deaths of members of the Telegraphers' Benefit Insurance are announced:

At St. Louis, C. W. Hills, formerly of Baltimore, Oct. 10, of pneumonia.

At Memphis, C. McCarthy, Nov. 8, of yellow fever.

THE telegraph ship Africa left Woolwich with 850 miles of cable to be laid between Alexandria and Brindisi. On completing this work the Africa will lay a cable across the Straits of Messina.

WE see it stated that the Paris evening journals get their news of the Bazaine court martial at Versailles by carrier pigeons, the Government regulation of the telegraph rendering it too slow for their use. Will Mr. Cresswell put that in his official pipe and smoke it?

WE regret to notice among recent reports several discharges for drunkenness and as many for default. And yet these cases are marvellously few considering the extent of the service, and the temptation to intemperance incident to a sedentary occupation.

THE Presidential mansion and the Government departments are being connected telegraphically with each other and the Capitol. The number of wires connected with the Capitol have been largely increased, and business will be greatly facilitated thereby.

THE question of the day seems to be, "Can intermediate earths be used to facilitate a through current during a storm?" We are waiting for a statement of the theory which a western official says he "established on the spot" where a ground wire was thus employed.

We learn by recent advices from London that Mr. Stearne's duplex machinery is still working its way more and more successfully into European telegraphy. The General Superintendent of Telegraphs in Russia has announced that it is now in successful operation between St. Petersburg and Moscow, a distance of 400 miles. Such a fact gives us a better idea of Russian civilization. And it is not without interest that we reflect that to a quiet and unpretentious American the great powers of Europe are indebted for the most valuable of modern inventions,

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 BROADWAY, NEW YORK,
November 15, 1873.

To all Offices on W. U. Lines:

The following changes and additions have been made since the date of the last Circular:

GENERAL INFORMATION.

Winsted and West Winsted, Conn., are one and the same place. The P. O. A. is West Winsted.

Madison, Ark., closed.

Claymont, Del., closed.

Half-rate messages can now be taken for Pensacola, Fla.

Carr and Bluff Hall, Ill., re-opened.

Allens, Ind., re-opened.

Lisbon, Me., re-opened.

Neponset, Mass., closed. Messages for Neponset will hereafter be delivered from Boston, Mass. Charges for delivery fifty cents.

Hereafter the "Tariff for Other Lines" to Barnsville, Md., will be 45 and 1 from Washington, D. C., or Point of Rocks, Md.

Mackinaw City, Mich., closed.

Au Gres, Lumber Boom, Mich., closed.

Martinsville, Miss., closed.

Water Valley, Miss., re-opened.

Attention is called, *for the third time*, to the fact that Lincoln, Neb., is a W. U. office, in square 474; business should be sent *via Atchison, Ks.*, and CHECKED DIRECT.

Franklin, Nev., closed.

Stough and Lewis, Nev., closed.

Woodland, Nev., closed.

Business for Rollinsford, N. H., will hereafter be checked to Great Falls, N. H., instead of South Berwick Junc., as heretofore.

Godwinville, N. J., closed.

Genesee, N. Y., changed to Wellsville.

Killawog, N. Y., closed.

So. Granby, N. Y., closed.

Londonderry, N. S., closed.

Medina, O., is now a W. U. office, square 180, check direct.

Glenwood, O., closed.

Glen Rock, Pa., closed.

Middaughs, Pa., closed.

Sinnemahoning, Pa., closed.

Fort's Station, Tenn., closed.

Meadow Creek, W. Va., closed.

NEW OFFICES.

401 Beebe, Ark.
300 Allendale, Ill.
327 Gridley, Ill.
261 Ossian, Ind.
367 Oxford Mills, Iowa.
28 Montague, Mass.; check Greenfield, Mass.
269 Allyton, Mich.
240 Franciscoville, Mich.
* Summit Sta.....25 2 { 200 Detroit, Mich. / 211 Toledo, O.
447 Raymore, Mo.
101 Wellsville, N. Y.
2 Spring Hill, N. S.
191 Black Creek, O.
191 Fredericksburg, O.
146 Port Royal, S. C.; check Beaufort, S. C.
484 Lovelady, Texas.
* New River Falls, W. Va., { 65 4 182 Huntington, W. Va. / 50 3 133 Greenbrier, W. S. Spgs., "

OFFICES HAVING SHEET C.

The following offices should be added to "Sheet C," and business checked direct:

24 Bloom, Wis.
7 Greenleaf, Wis.
2 Horn's Pier, Wis.
9 Lake Shore Junc., Wis.
9 West Bend, Wis.
29 Wilton, Wis.
38 Utica, Minn.

Austin, Minn., and Postville, Iowa, formerly Other Line offices, but checked direct as per Sheet C, are now W. U. offices, and should be checked direct at W. U. square rate.

The notice of the opening of Medina, O., office in JOURNAL of Oct. 15, 1873, should be disregarded.

ATLANTIC CABLE BUSINESS.

We are notified that the Cable between Falmouth and Lisbon is again repaired. Business can now be sent "via Falmouth."

WILLIAM ORTON, *President.*

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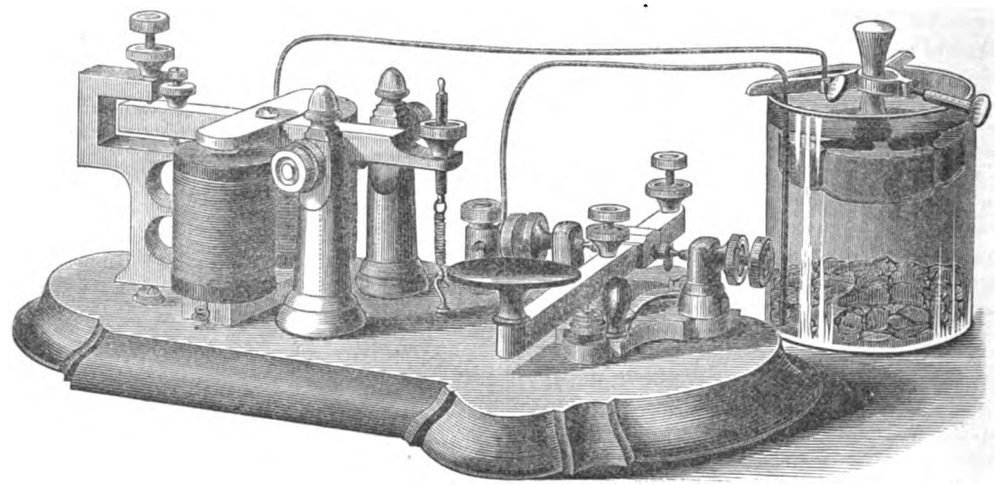
THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY,

AUGUST, 1873.

RESIGNATIONS.

L. O. Pierce.....Oswego, N. Y.
F. Farrell..... "
Jno. Kinney.....Rochester, N. Y.
A. C. Redman..... "
C. C. Widwood .....Schenectady, N. Y.
J. Marquette.....Syracuse, N. Y.
R. P. Humphrey.....Hornellsville, N. Y.
T. Armstrong.....Milford, Pa.
T. G. Clarke.....Albany, N. Y.
C. G. Daly..... "
Miss H. Bloxham.....Coxsackie, N. Y.
Emory Smith.....Coxsackie Station, N. Y.
Miss J. Burnett.....Carmonsville, N. Y.
E. A. Stevens.....Hudson, N. Y.
Miss E. Laurence..... "
C. Smith.....Williamstown, N. Y.
G. H. Caldwell.....Elizabeth, Md.
J. G. Craig.....Camden Station, Md.
E. Radigan..... Baltimore, Md.
R. H. Smith..... "
H. M. Fisher.....Birdsboro, Pa.
E. Hand.....Cape May C. H., N. J.
J. D. Goff.....Chester Heights, Pa.
E. Newkirk.....Clayton, N. J.
B. F. Baum.....Glen Rock, Pa.
M. Fockenthall.....Hellertown, Pa.
F. P. Ryan.....Hyde Park, Pa.
R. S. Tower.....Dubuque.
Wm. Brown.....Milwaukee.
F. M. Crittenton..... U. S. Yards,
J. Q. Mann.....Chicago, Ill.
A. H Babb..... "
D. B. Burnett..... "
Wm. Wallace..... "
M. P. Johnson.. ..... "
F. N. Schnell..... "
W. A. Huyck..... "
W. J. Hovey..... "
J. R. James..... "
C. B. French, Supt.....D. and S. P. R. R.
A. G. Haight.....Fort Scott, Ks.
C. E. Merrill.....Kansas City, Mo.
A. C. Barker.....Laurence, Ks.
J. W. Cook.....St. Louis, Mo.
C. W. Dickey..... "
J. E. Fleming..... "
A. W. Nohe..... "
G. H. Parmelee ..... "
P. Mixell ..... "
E. A. Gould ..... "
J. L. McBratney..... "
M. Ellison.....Colorado Springs, Col.
Conway.....Corinne, Utah.
Jos. Hood.....Divide, Col.
M. C. Hart.....Omaha, Neb.
T. P. Wheeler..... "
E. N. Snyder.....Salt Lake.
T. W. Clawson.....Aladdin, Pa.
W. B. Case.....East Liberty, Pa.
R. S. Emerson.....Fort Wayne, Ind.
W. B. Ogden.....Indiana, Pa.
A. B. Wells.....Pittsburgh, Pa.
J. H. Archibald.....Buffalo.
J. C. Graham.....Cleveland, O.
Miss A. Westerman.....Delaware, O.
Eugene Severein.....Port Huron, Mich.
W.P. Austin..... Port Austin, Mich.
B. F. Hendricks.....Toledo, O.
C. F. Reals.....Indianapolis, Ind.
J. C. Rust.....Lafayette, Ind.
J. J. Smith.....Athens, O.
W. H. Wires.....Cambridge, O.
J. L. Teague.....Vincennes, O.
J. E. Walters.....Beaver Dam, Va.
J. A. Stanfield.....Boston, Va.
J. A. Bransford.....Jarretts, Va.
J. E. Simpson.....Lynchburg, Va.
J. A. Burgess.....Yellow Springs.
G. D. Rollins.....Wilmington, Del.
T. A. Dayson.....Auburn, Ky.
J. A. Conley.....Huntsville, Ala.
C. W. Caton.....Lexington, Ky.
N. De Bree.....Louisville, Ky.
J. T. Olliver..... "
R. F. G. Bennett.....Pleasant Grove.
J. M. Ferris.....Stanton, Tex.



PARTRICK, BUNNELL & CO.'S

Champion Learners' Instruments.

COMBINED No. 1 SOUNDER AND KEY, with BATTERY, OFFICE WIRE, CHEMICALS, and a thorough BOOK of PRACTICAL INSTRUCTION in the Art of Telegraphy,

Which latter gives all necessary directions for setting up the Battery and complete apparatus, and operating them for practising or communicating purposes.

THIS IS WARRANTED TO BE, BEYOND ALL COMPARISON, THE BEST APPARATUS EVER OFFERED FOR THE USE OF STUDENTS OF TELEGRAPHY.

Being excellent Morse instruments, substantially made and nicely finished, with nothing left out of their construction which pertains to a Complete Sounder and Key Combination Set. Nothing made in miniature, or in awkward and unusual shape, as is done with the very cheap affairs usually offered as Learners' Apparatus. They are equally well suited

For TELEGRAPHIC SCHOOLS OF INSTRUCTION, For PRIVATE TELEGRAPH LINES, and For CITY WIRES OF TELEGRAPH COMPANIES.

The BATTERY which accompanies the Learners' Outfit is a full-sized Callaud, the same as the best cells used by Telegraph Companies for main battery, and gives sufficient power to produce a loud, clear sound from the instrument, the Sounder of which embodies the same remarkable principles of sound which have made our "Giant Sounders" so famous and popular among telegraphers.

The BOOK OF INSTRUCTION is a clear and practical explanation, by an experienced telegrapher, of every fact and principle of modern telegraphy and its apparatus which a student of the art could possibly require to obtain, in undertaking to become an accomplished sound operator.

PRICE OF APPARATUS complete, with Book of Instructions, Battery, Wire, and all necessary materials for one complete office outfit, ready for shipment, $10, sent by Express, C. O. D.; or $9.50, if money order for that amount be sent in advance. The latter plan will additionally save the purchaser the Express charges for returning money.

PARTRICK, BUNNELL & CO.,
88 South Fourth Street, Philadelphia.

W. H. Johnson.....Shelby City.
E. Ives.....Savannah, Ga.
R. E. Keron.....Augusta, Ga.
J. M. Graham.....Orangeburg.
E. M. Burch.....Sumpter, S. C.
T. P. Brown.....Savannah, Ga.
J. Murray.....Wetumpka, Ala.
A. B. Griswald.....Montgomery, Ala.
—. Ecton.....Deatsville, Ala.
W. P. Trites, "Dead".....Monroe, La.
T. B. Hines.....Newberry, Pa.
J. A. Logan.....New Brunswick.
F. H. Patrick.....Philadelphia, Pa.
J. E. Cardwell..... "
A. W. Hagenbuck.....Pittston, Pa.
E. French.....Red Bank, N. J.
R. A. Mulford.....Salem, N. J.
M. C. Gross.....West Chester, Pa.
V. P. Moore.....McComb City, Miss.
J. B. Allen.....Magnolia, Miss.
H. F. Laurence.....Vaughns, Miss.
F. W. McCarty.....Osyka, Miss.
J. A. Hagerlund.....San Marcos, Tex.
D. R. Sundford.....Corsicana, Tex.
W. J. Westervelt.....Plano, Tex.
H. A. Dusouchet.....Galveston, Tex.

IN the course of correspondence of an ordinary character, it has become a common and convenient method to give answer on the same sheet or on the face of the letter received. We wish it to be remembered that this cannot be done with postal cards. When used a second time, even if a one cent stamp is added, the charge to the receiver is six cents. The office at Springfield, Ill., has had to pay for several such errors, and requests us to call attention to it.

SECOND-HAND RELAYS.

A large lot of well polished and good working Relays for sale cheap.

Also several sets of

HICKS' REPEATERS,

In perfect order, at a nominal price.

GEO. H. BLISS & CO.,
41 Third Avenue,
Chicago, Ill.

MARRIED.

KEMP—PROCTOR.—At Wilford, Conn., September 4th, by Rev. A. J. Lyman, Lewis D. Kemp, Manager W. U. Telegraph, to Miss Eva Bell Proctor, of Dexter, Me.

MITCHELL—HALSEY.—At the residence of the bride's father, Halseyville, N. Y., October 16th, by the Rev. Lewis Halsey, Mr. J. J. Mitchell, Manager W. U. Telegraph, Ludlowville, N. Y., to Miss Lizzie M. Halsey, of the former place.

SCHUSTER—LOGAN—On Saturday, Oct. 18, at West Galway, Fulton Co., N. Y., by the Rev. David Anderson, Charles A. Schuster, of the Tariff Bureau of the Western Union Telegraph Co., New York, to Jennie D. Logan, both of New York city.

BORN.

HOAG.—In Oakland, Cal., Oct. 25, to Charles P. Hoag, of the W. U. Telegraph office, San Francisco, a daughter.

WILSON.—On October 27th, 1873, a son to Arch. Wilson, Jr., manager W. U. Telegraph Co., Balto City.

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TELEGRAPH OFFICE

OF

Anders' Magneto Printing Telegraph Instruments.

Telegraph Office of the BOSTON AND ALBANY RAILROAD,
BOSTON, Nov. 3, 1873.

MR. GEO. L. ANDERS.

Sir: Your "Magneto Printing" Telegraph Instruments, which have been in use on our line for the last eight months, have proved to be *very reliable*, and we would recommend them to any parties who want Printing Instruments.

Signed,
Z. GIBBS,
A. F. TUCKER, } Operators.

Office of the BOYNTON PACKING COMPANY,
BOSTON, Nov. 4, 1873.

MR. GEO. L. ANDERS.

Dear Sir: Your Magneto Printers, which have been on our line four months, have worked *splendidly*, and given entire satisfaction, and we do not hesitate to recommend all who may have use for telegraph instruments for *private lines* to purchase your Printers in preference to any others we have ever seen.

Yours truly,
H. P. SANBORN,
I. CHEEVER FULLER.

For RELIABILITY, RAPIDITY and ECONOMY combined,

ANDERS'

MAGNETO PRINTING TELEGRAPH INSTRUMENTS

are superior to any others yet produced. They have straight Key-boards, and will print *as fast* as any person can select the letters on the keys. Messrs. Sanborn & Fuller say they often send thirty words per minute by these instruments on the line of the Boynton Packing Company.

NO ACID BATTERY

is used. The currents being generated by induction from permanent magnets, the instruments are always ready for use, and all expense and trouble of Acid Batteries are avoided.

RELIABILITY.

They are so simple in construction that it is almost impossible (with ordinary care) to get them out of order, as has been proved by thorough trials.

We also continue to manufacture

ANDERS' MAGNETO DIAL TELEGRAPH INSTRUMENTS,

which are in use on the Police Lines of Boston, also on numerous private lines.

These instruments will work on longer lines, and with larger Dials and Indicators than any other Magneto Dial Instruments made.

Manufactured and for sale by

E. B. WELCH and GEO. L. ANDERS,

30 HANOVER STREET,
BOSTON, MASS.

RED STAR LINE.

ANTWERP SERVICE.

APPOINTED TO CARRY THE BELGIAN AND UNITED STATES MAILS.

		From Antwerp.	From Philad'a.
"VADERLAND," Captain Vander Heyden,	2800 tons.	Nov. 12.	Oct. 22.
"RYDAL HALL," Captain Collin,	2114 tons.	Oct. 11.	Nov. 5.
"NEDERLAND," Captain H. W. James,	3000 tons.	Oct. 25.	Nov. 22.
"SWITZERLAND," Captain ——,	3000 tons.	Building.	

PRICES OF PASSAGE:

Cabin.....$100 gold.
Steerage.....35 currency.

Prepaid Certificates, $36 currency.

LIVERPOOL SERVICE.

	Tons.	Master.	From Liverp'l.	From Philad'a.
"ABBOTSFORD,".....	2538.	Findlay.	Oct. 29.	Nov. 20.
"KENILWORTH,".....	2538.	Putt.	Nov. 12.	Oct. 23.

PRICES OF PASSAGE:

Cabin.....$100 gold.
Steerage.....30 currency.

Prepaid Certificates, $32 currency.

Tickets will be sold here at lowest rates, good from Antwerp and Liverpool to all interior points in the United States, *via* the Pennsylvania Railroad and its connections, thus affording parties in this country a convenient and cheap opportunity of sending for their friends in Europe.

THE RED STAR LINE will give special attention to the comfort of steerage passengers; comfortable berths, well-ventilated sleeping apartments and good food will be furnished them.

An experienced Surgeon is attached to each vessel.

Freight will be received at all principal points in the West and South, in connection with the Pennsylvania Railroad, Southern Mail Steam-hip Company and Clyde's lines, and through Bills of Lading issued for Antwerp, Bremen, Hamburg, Havre, Amsterdam, Rotterdam, Liverpool, London, Glasgow, Belfast, Hull and Leith.

The Red Star Line docks at Philadelphia are in direct connection with the Pennsylvania Railroad, and all merchandise intended for points beyond Philadelphia can be transferred from the hold of the steamer to the cars without the expense to shippers and risk of damage by re-handling, which results from cartage.

For rates of freight and passage, and other information, apply to

PETER WRIGHT & SONS,

GENERAL AGENTS, PHILADELPHIA.

William Hunter & Co., Agents, Liverpool. | B. Vonder Becke, General European Agent, Antwerp.

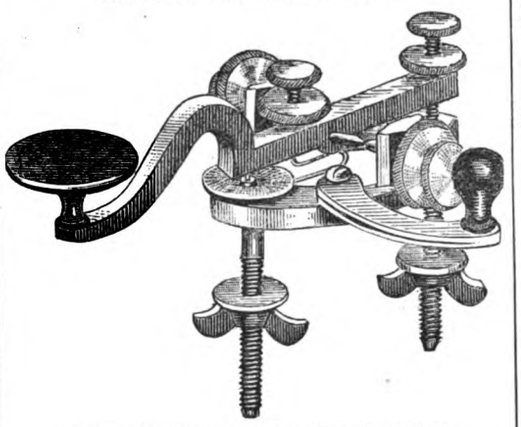
WATTS & COMPANY,

47 Holliday Street,
Baltimore, Md.,

SOLE MANUFACTURERS OF THE

PATENT CIRCUIT-CLOSER KEY,

Which has met with marked success.



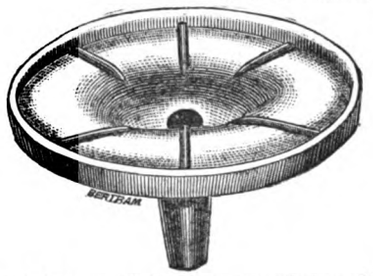
Price, $5 50 plain $7; nickel-plated.

The following is from a competent judge, written after some weeks' trial.

145 BROADWAY, NEW YORK,
Sept. 22d, 1873.

DEAR SIR,—Your circuit-closing attachment on the key, left with me for trial, is pronounced by all who have used it a decided and much-needed improvement on the common form.

Respectfully,
A. S. BROWN, *Manager.*



The Best Form of Battery Insulator Offered.

SIMPLE AND PERFECT.

Made of porcelain, handsome in appearance. Occupies little more space than the cell it supports. Each cell of battery completely isolated. Leakage is reduced to the minimum by the use of it.

General Superintendent Van Horn, Southern Division W. U. Tel. Co., writes of it:

"We have now in use a thousand or fifteen hundred of your battery insulators, and expect to order many more before the close of the year.

We have never used any battery insulator that equals it in any respect. In fact, it appears to be as near perfect as we can reasonably expect, in a contrivance for that purpose."

Price 40 cents

We offer a very excellent article of Galvanized Wire, superior to any in the market. The linemen on Baltimore and Ohio R. R. say they have never seen its equal for toughness and flexibility.

Special attention given to building.

Estimates given for any amount of material for telegraph construction or extension.

SWITCHES, GALVANOMETERS, RESISTANCE COILS, &c., to order.

Designs for Switch Boards for special service furnished.

SCOTT'S PATENT ANNUNCIATOR,

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Connect with the lines of the WESTERN UNION TELEGRAPH COMPANY at Pollard, Ala.

Governed by the same Rules and Regulations as the Western Union Telegraph Company.

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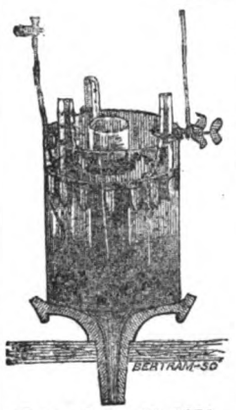
47 Holliday Street,
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MANUFACTURE

Telegraph and Electrical Instruments

OF EVERY DESCRIPTION.

Facilities for supplying any description of Machinery or Material equal to any in the United States.



Patented Dec. 31, 1872.

Over SIX THOUSAND cells of the Baltimore Battery in use by the Gold and Stock Telegraph Company of New York in their Private Line Department, is a sufficient acknowledgement of its merit, as a form of the gravity battery, combining the valuable principles of

Economy, Cleanliness and Constancy,

"—in fact a base-burner."

F. L. POPE,
Telegrapher, July 5th, '73.

SELF-FEEDING,

No Sulphate of Copper can reach the Sulphate of Zinc Solution.

The shape of Zinc and Copper, which, with the tube, were patented December 31st, 1872, secures the largest surface with least weight of the metals. Half pound sulphate copper per month, ample supply for No. 2, or 3.

Following is one of the many letters we have from reliable telegraphers:

PIEDMONT, W. Va., September 28th, 1873.

Messrs. WATTS & Co.,
Baltimore, Md.

GENTLEMEN:—On January 1st, 1873, I put up 75 cells of your No. 2, Baltimore Battery, in place of 40 cells of carbon, from which two railroad wires of 100 miles each, are supplied. It has not since been taken down or cleaned, and has required no attention, except to fill the tubes with blue stone, once each month, and replenish the fluid once or twice during this period, made necessary by evaporation.

I am fully convinced, from long experience, that this is superior to any other form of the gravity battery.

It has now been in constant use for nine months, and will not need new zinc until after January next.

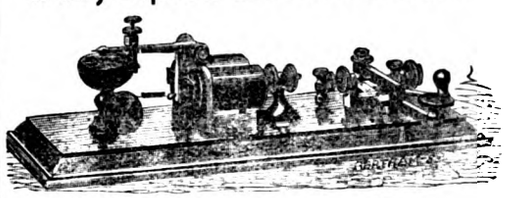
Respectfully,
J. G. NESBITT, *Manager.*

ORDERS FOR THIS BATTERY PROMPTLY FILLED.

A large stock constantly on hand.

No. 1 for Electro-motors, R. R. signals or similar service, $2.25
No. 2 ordinary local or Printing Telegraph main $1.75
No. 3 ordinary main $1.25

A very Superior Main Line Sounder.



Brass, $22.50. Nickel-plated, $25.00.

For wrecking purposes or temporary offices, this instrument is without a rival.

A perfect combination, handsome, good-sounding instrument.

NO LOCAL REQUIRED.

Well seasoned black walnut box, large enough for pencils, paper, plyers and office wire, in addition to the instrument, $4.

Larger size for climbers, vises, &c., $5.50.

RELAYS, SOUNDERS AND KEYS,

always on hand, plain or plated.

Our Challange Sounder is the noisest instrument made.

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IS SUPPLIED BY

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MANUFACTURERS, DEALERS and IMPORTERS

OF

TELEGRAPH MACHINERY, SUPPLIES

AND

Line Equipment of every Description.

MATERIAL AND INSTRUMENTS

always on hand, for the equipment of lines of any length, at a moment's notice.

We furnish first-class goods at low prices. Liberal arrangements made with Superintendents, Contractors and Builders of Telegraph Lines.

Registers	$38 00	to	$45 00
Spring Registers	47 50		.....
Relays	14 00	to	18 00
Sounders	3 50	to	7 50
Keys	4 00	to	6 50
Main Line Sounders	14 00	to	18 00
Combination Sets	20 00	to	30 00

Galvanometers, $7 00 upward.

POCKET INSTRUMENTS, Nickel Plated, in Hard Rubber Cases, 1¼x2x5 inches.

CUT-OUTS, Plug, Peg or Button, with or without Lightning Arresters, for one, two or more Lines.

JONES' PATENT LOCK SWITCHES, the best and cheapest in use, with or without Lightning Arresters.

PEG or PIN, CULGAN, REPEATING, GROUND, LOCAL, BATTERY and SINGLE BUTTON SWITCHES.

LIGHTNING ARRESTERS for any number of wires, of most approved patterns.

Electro-Magnets,
Permanent Magnets,
Apparatus for Students and Amateur Telegraphers,
Electric Motors,
Printing and Dial Instruments
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RHUMKORFF COILS, from ¼ to 10 inch spark.

GEISSLER'S TUBES, from $1.00 upward.

ELECTRICAL CALL AND ALARM BELLS in great variety, from $6.50 upward.

INSTRUMENTS furnished, Nickel Plated, at 20 per cent. advance on List Prices.

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GUTTA-PERCHA COVERED WIRES, all sizes.

BISHOP'S NEW COMPOUND COVERED WIRE, for running into offices, 4c. per foot.

MAGNET WIRES, in Silk and Cotton, at Factory prices.

INSULATED WIRES for special purposes made to order.

SILK COVERED SWITCH CORD, one, two or more conductors.

PATENT MESSAGE HOOKS, the best ever introduced, prices 65c. and 75c. per dozen.

MANIFOLD PAPER and AGATE STYLUS at bottom prices.

Cables and Submarine Wires.
Repairers' Tools and Tool Bags.
Glass and Rubber Window Tubes.
Insulators of every Description.
Brackets, Pins and Spikes.

HILL, CALLAUD, GROVE, BUNSEN, CARBON, DANIELLS, LE CLANCHE, NITRO-CHROMIC, AND OTHER STYLES OF BATTERY IN ANY QUANTITIES.

PURE CHEMICALS AT LOWEST PRICES.

SULPHATE OF COPPER A SPECIALTY, AND PRICES VERY LOW.

CARBON PLATES made to order for Grenil, Smee, Stohrer and other Batteries.

OFFICE FIXTURES AND BATTERY UTENSILS OF EVERY DESCRIPTION.

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ALL STANDARD WORKS on ELECTRICITY AND TELEGRAPHY.

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RICHARD JOHNSON & NEPHEW'S celebrated LINE WIRE.

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New and Superior patterns of

STANDARD TELEGRAPH INSTRUMENTS.

Their RELAYS, SOUNDERS, and KEYS which have been specially designed by Mr. F. L. Pope, are elegantly designed, thoroughly well finished and scientifically adapted to the service required and are recommended as SUPERIOR TO ANY HITHERTO OFFERED.

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We have for sale also THE NONPAREIL TELEGRAPH INSTRUMENT for amateurs, learners and short lines.

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Bradley's Box Relays and Sounders.
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Bradley's Naked Wire Helices and Magnet Spools to order, any desired size and resistance, at manufacturers' lowest price.

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LECLANCHÉ BATTERIES.

CAUTION.

All persons are hereby notified that Batteries

INFRINGING UPON OUR PATENT

are in the market (some of them nearly worthless). The Public are warned against using any such infringement, as in every case the guilty parties will be prosecuted to the fullest extent of the law. The GENUINE BATTERIES have the words "PILE LECLANCHÉ" on the Carbons and Glasses. Any information concerning such infringements will be thankfully received by the

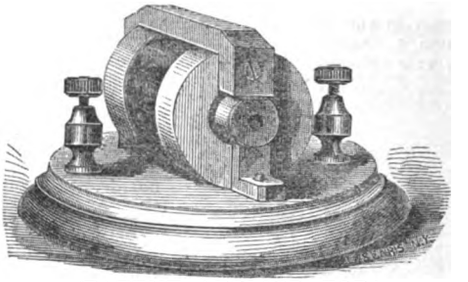
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No. 40 West 18th St.

NEW YORK, Oct. 11th, 1878.

SOMETHING NEW.

"The Rattler" Telegraph Sounder.



(PATENT APPLIED FOR.)

This is a very simple and effective Instrument, and, as it does not require any spring to draw the lever back, is always adjusted.

PRICE, - - - - $3.50.

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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 25. NEW YORK, DECEMBER 1 1873. WHOLE NO. 146.

AUTOMATIC TELEGRAPHS.

CASELLI'S CHEMICAL COPYING TELEGRAPH.

The Abbe Caselli constructed a chemical copying telegraph in which he attained a synchronous movement in a somewhat surer way than by the methods adopted by either Bain or Bakewell.

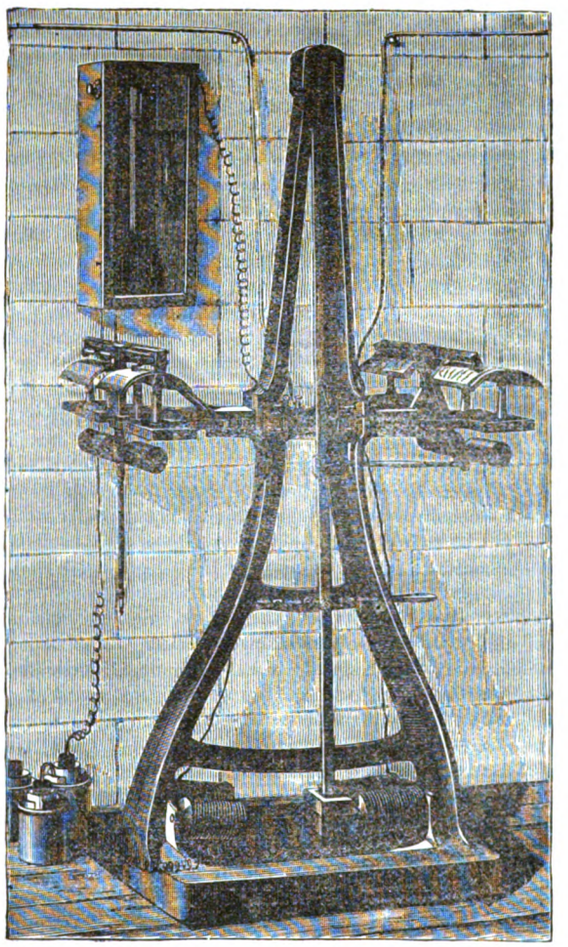
His apparatus consisted of a long and heavy pendulum sustained in synchronous oscillation by the electro-magnet, and rocking, by means of a coupling bar, two metallic styles over the cylindrical stages.

The instrument consists of three principal parts—the motor, the copying style, and the time regulator. By reference to the illustration given, the different parts can readily be identified.

The pendulum rod is suspended from the top of an iron frame; the bob of the pendulum is constructed of iron and lead, the latter being employed for giving the necessary steadiness to the oscillations, and the former as armature for two fixed electro-magnets, one on each side at the foot of the frame.

The coils of these electro-magnets are connected with a local battery, and with a contact worked by the pendulum of a clock in the station, whose duty is not only to sustain the oscillations of the telegraph pendulums, but also to retain them, if need be, an instant, in order to re-establish their synchronism.

This motor is connected with the copying style by means of a rod between the pendulum rod and the end of a lever turning upon a pin in the axis of two cylindrical segments, or stages, and carrying upon its upper end the cross-beam. The latter carries on each side a fine screw, on which a nut rides, which carries the copying style. When the pendulum oscillates, therefore, an oscillating movement is imparted to the cross-beam, screw, and style, which cross and recross the surface of the cylindrical segments, or stages, following the movement of the pendulum rod. In order to avoid the styles passing twice over the same line, the screws by which they are carried end in ratchet-wheels, which, after every oscillation, are pushed round a tooth further, and thus draw the styles a given distance along in the direction of the cylinder. The styles consist of fine iron wires carried by guides in the electrical circuit. The styles are each only allowed to fall upon the cylindrical stages during oscillation in one direction, and as each apparatus carries two styles, one of them is down during the backward, and the other during the forward stroke. It is usual to receive on one side and to transmit on the other, by which a message may be received and one transmitted at the same time. On the side upon which the transmission is effected a leaf of metallic paper is fixed, upon which the despatch or design to be sent is written in insulating ink. When, therefore, the iron style passes and repasses over the surface, the current is interrupted during the time that a line of insulating ink is between the metallic surface and style. The reception, upon the other side, is done by means of a damp sheet of paper, impregnated with a solution of ferrocyanide of potassium. Under the influence of the galvanic current, this salt is decomposed, and forms, in contact with the iron style, a blue deposit, known as "Prussian blue." Thus, when the pendulum at the receiving station corresponds in its oscillations with that at the sending station, and both styles make the down stroke together, that of the reception marks the paper with a series of blue lines corresponding with the continuations of the line current given from the transmitter.



This telegraph was invented in 1856, but was not brought into a practical form until eight years afterwards. Froment, of Paris, succeeded in overcoming the mechanical difficulties which had until then opposed its progress. In 1865 two of these instruments were set up at work between Paris and Lyons, on which line they are still employed. The despatches sent by them are, however, of limited number, and are dearer, because they occupy more time, than those sent by the other method. In its operations, the Caselli telegraph, like all the copying telegraphs, is slow. Each line through which the style runs is 111$^{mm.}$ long, and occupies one second of time; and as the lines are 0·25$^{mm.}$ apart, therefore four seconds are necessary for every millimètre breadth of despatch. On a sheet of paper 111$^{mm.}$ by 27$^{mm.}$ about twenty-five words can be written, which therefore occupy 108 sec., or 1 min. 48 sec., in transmission—a speed which is exceeded only by the common Morse apparatus. Even if the back stroke of the pendulum be, at the same time, used for a return message, the speed is still very far below that of the Hughes instrument.

DECOMPOSITION BY ELECTRICITY.

It is wonderful to observe how small a quantity of a compound body is decomposed by a certain portion of electricity. Let us, for instance, consider this and a few other points in relation to water. *One grain* of water, acidulated to facilitate conduction, will require an electric current to be continued for three minutes and three-quarters of time to effect its decomposition, which current must be powerful enough to retain a platina wire, $\frac{1}{104}$th of an inch in thickness*, red hot, in the air during the whole time; and if interrupted anywhere by charcoal points, will produce a very brilliant and constant star of light. If attention be paid to the instantaneous discharge of electricity of tension, as illustrated in the beautiful experiments of Mr. Wheatstone†, and to what I have said elsewhere on the relation of common and voltaic electricity, it will not be too much to say, that this necessary quantity of electricity is equal to a very powerful flash of lightning. Yet we have it under perfect command; can evolve, direct, and employ it at pleasure; and when it has performed its full work of electrolyzation, it has only separa ed the elements of a single grain of water.

I showed in a former series of these Researches on the relation by measure of common and voltaic electricity, that two wires, one of platina and one of zinc, each $\frac{1}{18}$th of an inch in diameter, placed $\frac{5}{16}$ths of an inch apart and immersed to the depth of $\frac{3}{8}$ths of an inch in acid, con-

* I have not stated the length of wire used, because I find by experiment, as would be expected in theory, that it is indifferent. The same quantity of electricity which, passed in given time, can heat an inch of platina wire of a certain diameter red hot, can also heat a hundred, a thousand, or any length of the same wire to the same degree, provided the cooling circumstances are the same for every part in both cases. This I have proved by the volta-electrometer. I found that, whether half-an-inch or 8 in. were retained at one constant temperature of dull redness, equal quantities of water were decomposed in equal times in both cases. When the half-inch was used, only the centre portion of wire was ignited. A fine wire may even be used as a rough but ready regulator of a voltaic current; for if it be made part of the circuit, and the larger wires communicating with it be shifted nearer to or further apart, so as to keep the portion of wire in the circuit sensibly at the same temperature, the current passing through it will be nearly uniform.

† "Literary Gazette," 1833, March 1 and 8; "Philosophical Magazine," 1833, p. 204; "L'Institute," 1833, p. 261.

sisting of one drop of oil of vitriol and 4 oz. of distilled water, at a temperature of about 60° Fahr., and connected at the other extremities by a copper wire 18 ft. long and $\frac{1}{18}$th of an inch in thickness, yielded as much electricity in little more than three seconds of time as a Leyden battery charged by thirty turns of a very large and powerful plate electric machine in full action. This quantity, though sufficient if passed at once through the head of a rat or a cat to have killed it, as by a flash of lightning, was evolved by the mutual action of so small a portion of the zinc wire and water in contact with it, that the loss of weight sustained by either would be inappreciable by our most delicate instruments; and as to the water which could be decomposed by that current, it must have been insensible in quantity, for no trace of hydrogen appeared upon the surface of the platina during those three seconds.

What an enormous quantity of electricity, therefore, is required for the decomposition of a single grain of water! We have already seen that it must be in quantity sufficient to sustain a platina wire $\frac{1}{10}$th of an inch in thickness, red hot, in contact with the air for three minutes and three-quarters, a quantity which is almost infinitely greater than that which could be evolved by the little standard voltaic arrangement to which I have just referred. I have endeavored to make a comparison by the loss of weight of such a wire in a given time in such an acid, according to a principle and experiment to be almost immediately described; but the proportion is so high, that I am almost afraid to mention it. It would appear that 800,000 such charges of the Leyden battery as I have referred to above would be necessary to supply electricity sufficient to decompose a single grain of water; or, if I am right, to equal the quantity of electricity which is naturally associated with the elements of that grain of water, endowing them with their mutual chemical affinity.

In further proof of this high electric condition of the particles of matter, and the *identity, as to quantity, of that belonging to them with that necessary for their separation*, I will describe an experiment of great simplicity, but extreme beauty, when viewed in relation to the evolution of an electric current and its decomposing powers.

A dilute sulphuric acid, made by adding about one part by measure of oil of vitriol to thirty parts of water, will act energetically upon a piece of plate zinc in its ordinary and simple state; but, as Mr. Sturgeon has shown,* not at all, or scarcely so, if the surface of the metal has in the first instance been amalgamated; yet the amalgamated zinc will act powerfully with platina as an electromotor, hydrogen being evolved on the surface of the latter metal, as the zinc is oxidized and dissolved. The amalgamation is best effected by sprinkling a few drops of mercury upon the surface of the zinc, the latter being moistened with the dilute acid, and rubbing with the fingers so as to extend the liquid metal over the whole of the surface. Any mercury in excess, forming liquid drops upon the zinc, should be wiped off †.

Two plates of zinc thus amalgamated were dried and accurately weighed: one, which we will call A, weighed 163·1 grains; the other, to be called B, weighed 148·3 grains. They were about 5 in. long, and 0·4 of an inch wide. An earthenware pneumatic trough was filled with dilute sulphuric acid, of the strength just described, and a gas jar, also filled with the acid, inverted in it*. A plate of platina of nearly the same length, but about three times as wide as the zinc plates, was put up into this jar. The zinc plate A was also introduced into the jar, and brought in contact with the platina, and at the same moment the plate B was put into the acid of the trough, but out of contact with other metallic matter.

Strong action immediately occurred in the jar upon the contact of the zinc and platina plates. Hydrogen gas rose from the platina, and was collected in the jar; but no hydrogen or other gas rose from *either* zinc plate. In about ten or twelve minutes, sufficient hydrogen having been collected, the experiment was stopped: during its progress a few small bubbles had appeared upon plate B, but none upon plate A. The plates were washed in distilled water, dried, and reweighed. Plate B weighed 148·3 grains, as before, having lost nothing by the direct chemical action of the acid. Plate A weighed 154·65 grains, 8·45 grains of it having been oxidized and dissolved during the experiment.

The hydrogen gas was next transferred to a water-trough and measured; it amounted to 12·5 cubic inches, the temperature being 52°, and the barometer 29·2 inches. This quantity, corrected for temperature, pressure, and moisture, becomes 12·15453 cubic inches of dry hodrogen at mean temperature and pressure, which, increased by one-half for the oxygen that must have gone to the *anode*, i.e. to the zinc, gives 18·232 cubic inches as the quantity of oxygen and hydrogen evolved from the water decomposed by the electric current. According to the estimate of the weight of the mixed gas before adopted, this volume is equal to 2·3535544 grains, which therefore is the weight of water decomposed; and this quantity is to 8·45, the quantity of zinc oxidized, as 9 is to 32·31. Now taking 9 as the equivalent number of water, the number 32·5 is given as the equivalent number of zinc—a coincidence sufficiently near to show, what indeed could not but happen, that for an equivalent of zinc oxidized an equivalent of water must be decomposed.†

But let us observe *how* the water is decomposed. It is electrolyzed, *i. e.*, is decomposed voltaically, and not in the ordinary manner (as to appearance) of chemical decompositions; for the oxygen appears at the *anode* and the hydrogen at the *cathode* of the decomposing body, and these were, in many parts of the experiment, above an inch asunder. Again, the ordinary chemical affinity was not enough, under the circumstances, to effect the decomposition of the water, as was abundantly proved by the inaction on plate B; the voltaic current was essential. And to prevent any idea that the chemical affinity was almost sufficient to decompose the water, and that a smaller current of electricity might, under the circumstances, cause the hydrogen to pass to the *cathode*, I need only refer to the results which I have given to show that the chemical action at the electrodes has not the slightest influence over the *quantities* of water or other substances decomposed between them, but that they are entirely dependent upon the quantity of electricity which passes.

What, then, follows as a necessary consequence of the whole experiment? Why, this—that the chemical action upon 32·31 parts, or one equivalent of zinc, in this simple voltaic circle, was able to evolve such quantity of electricity in the form of a current as, passing through water, should decompose 9 parts, or one equivalent of that substance; and, considering the definite relations of electricity as developed in the preceding parts of the present paper, the results prove that the quantity of electricity which, being naturally associated with the particles of matter, gives them their combining power, is able, when thrown into a current, to separate those particles from their state of combination; or, in other words, that *the electricity which decomposes, and that which is evolved by the decomposition of, a certain quantity of matter are alike.*

But admitting that chemical action is the source of electricity, what an infinitely small fraction of that which is active do we obtain and employ in our voltaic batteries! Zinc and platina wires, $\frac{1}{18}$th of an inch in diameter and about half an inch long, dipped into dilute sulphuric acid, so weak that it is not sensibly sour to the tongue, or scarcely to our most delicate test-papers, will evolve more electricity in $\frac{1}{10}$th of a minute than any man would willingly allow to pass through his body at once. The chemical action of a grain of water upon four grains of zinc can evolve electricity equal in quantity to that of a powerful thunder-storm. Nor is it merely true that the quantity is active; it can be directed and made to perform its full equivalent duty. Is there not, then, great reason to hope and believe that, by a closer *experimental* investigation of the principles which govern the development and action of this subtile agent, we shall be able to increase the power of our batteries, or invent new instruments which shall a thousandfold surpass in energy those which we at present possess?—*Faraday.*

THE TELEGRAPH OF NATURE.

Look up to these clouds, these great water-carriers for a world, how joyously and jauntily they career along! The huge masses skip and whirl, and chase each other like lambs at play, neither wearied by the weight they bear, nor dizzy by the long look-down. Here, for once, is perfect engineering applied to water-supply. No retaining-walls are needed, and no windings to maintain the level. How softly they lie; how quickly they move; how gently they fall where they are needed, and when!

You are awakened out of your first sleep by the rattling at the casement, and a rumbling in the chimney. You rise and look out on the moon-lit sky; the cause of the nocturnal commotion is discovered at a glance. An interminable line of laden clouds, like a luggage train, each wagon heaped above its brim, is spinning eastward through the sky, from the Atlantic to the dry table-lands, on the confines of Europe and Asia. Those thirsty regions had telegraphed to their correspondent in the Western waters that the Caspian and Dead seas were in danger of becoming dry. The correspondent, ever watchful, and having withal a large stock in hand, newly distilled from the Atlantic, immediately dispatched an extraordinary night-train, with orders to run express all the way, "for the King's business required haste." There it goes frightfully quick, and with an infinity of imposing sound. But you may perceive it is running on the main line; the axletrees are well-greased, and the switches are all right. You tumble into bed again by way of shutting yourself into a siding, and sleep soundly till morning, confident that no collision will take place.—*Chicago Standard.*

An attempt was recently made at San Francisco to find the easterly current, and by its aid to reach New York by balloon in a few hours' time. The machine took a fine start, having on board three passengers, who, instead of finding the breeze they wanted, struck a westerly current and came down in the Pacific ocean, happily near the shore. The balloonists were received by boats and had a narrow escape.

* "Recent Experimental Researches," &c., 1830, p. 74, &c.

† The experiment may be made with pure zinc, which, as chemists well know, is but slightly acted upon by dilute sulphuric acid, in comparison with ordinary zinc, which during the action is subject to an infinity of voltaic actions. See De la Rive on this subject, "Bibliothèque Universelle," 1830, p. 391

* The acid was left during a night with a small piece of unamalgamated zinc in it, for the purpose of evolving such air as might be inclined to separate, and bringing the whole into a constant state.

† The experiment was repeated several times with the same results.

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ACADEMY OF SCIENCE.

PHENOMENA OF GREAT STORMS—BY PROF. ELIAS LOOMIS.

This paper was described by title as "Some Results Derived from Examination of the United States Weather Maps."

The remarks I propose to make consist rather of a statement of what I am engaged in doing than of results which I am prepared to communicate. It is known to some persons that many years ago I undertook the investigation of certain storms, particularly Winter storms. Some 30 years ago I published in the transactions of the Philosophical Society of Philadelphia my investigations of a remarkable storm which was experienced throughout the United States in December, 1836. This storm of December, 1836, was followed a few days after by a remarkable storm in New York, and many conjectured at that time that there was a connection between the two storms; that the American storm crossed the Atlantic. Some years after, in 1856, I spent some time in Europe, and improved the opportunity to collect observations relating to this storm. I collected copies of meteorological journals for that period, and on my return undertook a new investigation of the phenomena of that storm, and of the American storm that preceded it. I have received maps regularly from the Department for about two years, and have preserved them carefully. I have thought it worth while, however, to undertake myself a systematic examination of these maps.

I first prepared a skeleton map upon precisely the same scale as the Washington maps, confining myself, however, to that portion of the country over which these storm tracks usually pass. Although these weather maps extend to the Pacific, the Department has never drawn isobaric lines extending beyond the Rocky Mountains with one exception, so that I was compelled to reduce the dimensions of my skeleton map, though retaining precisely the same scale. The first step consisted in transferring the tracks of all these barometric minima to this map.

The next step consisted in tabulating all these results. The lines on the maps are measured, and the dates and movements recorded in tables for two years. The direction of the storm track, and its motion per day, is indicated so that the tables show the progress in 24 hours of the barometric minima and their direction. He had complete tables for these months for two years. These tables, together, would show the average rate of progress of barometric minima and avorage direction. The average rate of progress each day for January was 680 miles; for February, 740 miles; for March, 940 miles; for April, 615 miles. The average for these four months was little less than 700 miles—a trifle less than 30 miles an hour. For the month of January the average direction of progress is 5 degrees north of east; that is the direction toward which the storm travels. It is very rare indeed that a storm travels toward the west, though we had one of that sort during the last week. There are only one or two decided cases of that kind in the period of two years. They almost invariably travel toward the east and a little north of east. For February the average is about 13 degrees north of east; for March, 11 degrees north of east; for April, 16 degrees north of east.

The object which I propose in this research will be to investigate the various circumstances which seem to cause these movements, the rate and the direction; to determine what other meteorological elements are connected with these. I tabulate with these numbers, therefore, a good many other points. One is a tabulation of what they call the "low," which means simply the lowest barometrical indication on the weather maps. Another is the fall in 24 hours—the fall of the barometer in that place where there is a "low." This is easily ascertained by consulting the map of the previous day at that place. The rise in the next 24 hours at the same place is found in the same way. Another element tabulated is the change of the "low." One day a "low" will be 29.4°; the next day it will be found some 500 miles east and perhaps will be 29.5° or 29.3°. It will not be generally stationary from one day to another. In other words, the storm will be increasing or diminishing in violence.

There is one point in regard to which he could make a somewhat precise statement. It is what might be called the stationary "low"; that is a stationary storm. In general, these storms travel with considerable velocity; occasionally we find examples of storms stationary for 24 hours, sometimes two or three days; there are examples of very violent storms remaining stationary for four days. The European storm of 1836 was the memorable storm of the century in its violence, which extended through Great Britain and all over the continent. At that time there was formed a "low" almost exactly over Switzerland, which continued stationary for four days, and the isobaric curves at that time were quite symmetrical and nearly circular, though slightly elliptical. The depression of the barometer at the centre of the storm was from a $\frac{1}{4}$ to $\frac{1}{2}$ of an inch below the average minimum.

Similar phenomena have been noticed since then in many instances in Europe. The localities where they have been most frequently observed are off the Irish coast, or somewhere along the coast line from the north of Scotland following down the English and French coasts to that of Spain. An average of notable cases of that sort were collated to the number of six or seven per annum, where the barometer sank very low and continued long at the same depression.

In examining the United States maps he had been struck with the circumstance that a storm traveling across the United States to Maine and New Brunswick would stop there, and the "low" be marked there for two or three successive days. There was no evidence whether the "low" proceeded beyond that point, as the map cannot give further information. However, by comparing these observations carefully it will be found that the actual height of the barometer at these most easterly stations continues the same during two or three successive days. Professor Loomis attributes this phenomena to local causes. These are probably the characteristics of the surface of the country—the high ranges of mountains which force the currents of air upward and cause condensation of moisture. In the case of Switzerland, this is occasioned by the Alps; in our country it is the high lands of Maine and the White and Green Mountain ranges. When there is a barometric minimum in that region, the air on the south side comes in from the ocean, and will be drawn in from considerable distances, probably from over the warm waters of the Gulf Stream.

DISCUSSION BY PROF. HENRY.

Prof. Henry suggested that if the storm comes to the seaboard the air is constantly drawn in from sea, bringing an immense amount of vapor. This may continue several days, constituting at Boston, for instance, a long and violent northeast storm, when 50 or 75 miles back in the country the air is clear. The storm appears to be produced by the heating of the lower strata and their expansion; then the epuilibrium being disturbed there is a rushing up of the moist air into a higher region, where it is condensed and the caloric given out, whereby the effect is increased. The whole storm is wafted eastward till it comes to the seaboard, where it obtains a continued supply. In the interior the supply at a given point is soon exhausted, and this may be a cause of the storm moving eastward. During a storm at the seaboard there is a motion outward; the wind is blowing inward from the ocean below, but outward toward it above. Great interest attaches to the investigations which Prof. Loomis is making.

LEGAL PAR IN STERLING EXCHANGE.

A long-needed law passed the last Congress, intended to eliminate from all accounts with Great Britain the confusion and obsolete fiction of 9½ per cent., miscalled "exchange." By an old law the Custom-House valuation of the pound was $4.44. Owing, however, to a change in the relative value of the precious metals, the gold in the pound had come to be worth a little over $4.86, or about 9½ per cent. more than the legal valuation. But in all the accounts, and in all the tables, the old legal valuation, $4.44, is first assumed, and then the 9½ per cent. is added to correct the error. It has no more to do with "exchange" than the mariner's allowance for deviation of the compass needle has to do with a correct observation of the sun's altitude.

The 9½ per cent. added to the wrong valuation makes the right one, and then the real rate of exchange is expressed by the fluctuations of one or two per cent. around that point. Thus exchange now called 111 is really only at 1½ per cent. above par; and at 108 it is about 1½ below par.

But Congress now wipes out the old fictitious valuation, and establishes the correct one, and after January next the 9½ per cent. will cease to encumber the tables of exchange and every money calculation between the United States and England. We reprint the principal section of the law, as follows:

In all payments by or to the Treasury, whether made here or in foreign countries, where it becomes necessary to compute the value of the sovereign or pound sterling, it shall be deemed equal to four dollars eighty-six cents and six and one-half mills, and the same rule shall be applied in appraising merchandise imported where the value is, by the invoice, in sovereigns or pounds sterling, and in construction of contracts payable in sovereigns or pounds sterling; and this valuation shall be the par of exchange between Great Britain and the United States; and all contracts made after the first day of January, 1874, based on an assumed par of exchange with Great Britain of fifty-four pence to the dollar, or four dollars and forty-four and four-ninths cents to the sovereign or pound sterling, shall be null and void.

Beside the gain in simplicity and intelligibleness in all our international accounts, there will be one result of this change that will be peculiarly gratifying to Americans. Assuming that Great Britain accepts the correction and adjusts her quotations accordingly, all our securities will thenceforth be quoted, on the average, 9½ per cent. higher than now. When our five-twenties are worth par they will be so quoted in England, and not at 91, as heretofore. And, as English quotations are a sort of standard for Europe, there will be eventually a higher appreciation of credit and financial rank of the United States among the nations.

MM. Tréve and Chedeville find that if a current of electricity traverses a coil of wire that surrounds a cooling ingot of cast steel, the steel, when perfectly cold, shows on fracture a finer grain than when the current is not passed. The magnetized steel also had less power of resisting forces of extension and compression.—*Scribner.*

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THE SIGNAL SERVICE.

The connection of the Signal Service with the lines of telegraph throughout the country renders its operations more or less important to all engaged in telegraphic service. The annual report of the Chief Signal Officer has just been published, from which we glean as follows :

Systematic and continuous instruction of the army in military signaling and telegraphy during the past year has been given at the Signal School of Instruction at Fort Whipple, Va., and in the Department of the Missouri. The recommendation made in previous reports, that special instruction at the Military Academy should be provided for, with a merit value given it, affecting the standing of the cadets, is renewed, and it is also suggested that to secure accuracy and uniformity, the officer to be in future charged with that instruction should have passed through the course at Fort Whipple.

Six commissioned officers have received instruction at Fort Whipple during the year. Sixty-seven private soldiers have been instructed as candidates for promotion to the grade of observer-sergeant, and 127 as assistants to observer-sergeants.

The whole number of stations from which the office now receives its stated meteoric reports is 92, of which 78 are the regular stations in the United States ; 11 are in Canada ; three in the West Indies. Of the stations in the United States, 13 have been added during the year ; and of the Canadian, from which reports have been received by comity of exchange with the Dominion Meteorological Bureau, four are new. The regular telegraphic reports from Havana, Cuba, began on August 6 ; from Kingston, Jamaica, on September 18, and from Santiago de Cuba on September 29. Three other points in the islands of Porto Rico, Guadaloupe, and Barbadoes, will be equipped as soon as observers can be designated.

The total number of tabulated bulletins issued and distributed at the several lake, seacoast, and river ports and inland cities has been 143,097, excluding the river bulletins of changes in depth of water of principal rivers. The total number of weather charts issued and distributed has been 320,770, and the press reports (exclusive of the publication of the synopsis and probabilities) have been 23,224. Nine thousand four hundred and two copies of "the weekly weather chronicle" and 6,896 of the "monthly weather review" have been furnished and gratuitously distributed to the press, agricultural and commercial associations, institutions of learning and scientific persons.

The office has, under the direction of the Secretary of War, continued its exertions to solve, for the special benefit of the agricultural interests, the problem of giving promptly the information contained in the daily weather reports to the many farming and other communities not now reached by telegraph, and for which the copies published by the press do not arrive in time for use. The plan adopted has been to divide the territory of the United States into districts, each district having a distributing point at or near the centre, from which two printed copies of the Synopses and Probabilities are forwarded by mail to all post-offices within the districts, and which can be reached by rail, steamer or mail coach by 4 P. M. of the same day. This plan has been put in operation with the co-operation of the Post-office Department, the bulletins being exhibited in frames by each postmaster at each post-office as soon as received, and now provides for the regular distribution daily of 8,982 printed copies of the Weather Report, for display at 4,191 different post-offices.

For the study of the phenomena of the upper portions of the atmosphere, in view of the benefit of the deductions to be had from them, and to determine more accurately the proper reductions to be made for great elevations, stations have been established at favorable points. In addition to those on Mount Washington, N. H., and on Mount Mitchell, N. C., the difficult task of establishing a permanent telegraph station on the summit of Pike's Peak, at an elevation of 14,216 feet, has been accomplished with the sanction of the Secretary of War. A telegraph line has been built to connect the station with Colorado Springs, and it is now in operation.

The ascertained comparative accuracy of the deductions from reports, styled "Probabilities," has been more clearly presented in this than in preceding years. The percentage of verification has been mathematically computed for each of the geographical districts mentioned in the reports. The annual average of verifications has been as follows for the following named districts :

New England, 81.50 ; Middle States, 81.17 ; South Atlantic, 79.92 ; Lower Lakes, 78.90 ; Eastern Gulf, 77.16 ; Ohio Valley, 76.42 ; Western Gulf, 74.40 ; Upper Lakes, 75.25 ; North West, 74.00.

An additional duty was imposed upon the Secretary of War by the legislation of the last Congress, authorizing the establishment of signal stations at lighthouses and at such of the life-saving stations on the lake or sea coasts as may be suitably located for that purpose, and to connect the same with such points as may be necessary for the proper discharge of the duties of the Signal Service by means of a suitable telegraph line, in cases where no lines are in operation. In discharge of this duty, a telegraph line has been completed, ten miles in length, from Seaville to Peck's Beach, N. J., connecting at Seaville with the line of the Western Union Telegraph Company. The material is ready, and the work is in progress on the construction of a line from Sandy Hook to Barnegat Inlet, N. J., a distance of 50 miles, connecting with the Western Union line at Long Branch. These connections will allow of signals being displayed at the life-saving stations established at Sandy Hook, Long Branch, Barnegat, Atlantic City, Peck's Beach and Cape May. The plan in contemplation proposes the establishment of signal stations at life-saving stations and lighthouses along the ocean coast of New Jersey, from Sandy Hook to Cape May, at distances of 25 miles from each other. A line is in process of erection from the village of Rockport, Mass., to Thatcher's Island Lighthouse, a distance of three miles and a half, of which one mile and a half will be cable. A line connecting the stations at life-saving stations and lighthouses along the coast, from Norfolk, Virginia, to Cape Hatteras, North Carolina, a distance of 137 miles, and on one of the most dangerous coasts of the United States, is in construction. It is expected that the above-mentioned lines will be completed during the present year. Attention is invited to the fact that the whole work now done in the erection of these lines, and to be done hereafter in operating them, has been done, and is to be done, by the officers and men of the Signal Service of the army.

The Chief Signal Officer refers to the proceedings of the Meteorological Congress of Vienna, held in pursuance of invitations officially issued by the Austrian Government, for a convention of persons charged with meteorological duties in different countries. The adoption, by the unanimous vote of the Congress, of a proposition to the effect that it is desirable, with a view to their exchange, that at least one uniform observation, of such character as to be suitable for the preparation of synoptic charts, should be taken and recorded daily and simultaneously at as many stations as practicable throughout the world, is regarded as of special importance in reference to works of the kind now undertaken by the United States. This formal announcement, with such sanction, tends directly to the establishment of systems of signals and weather reports common among civilized nations.

Arrangements have already been made with Russia and Turkey to begin, on January 1, 1874, the exchange with the United States of one daily report, taken simultaneously at the different stations throughout the great territorial extent of the Russian and Turkish Empires and the United States. The co-operation of the systems of other nations is expected.

DETERMINATION OF ORGANIC IMPURITIES IN WATER.

Water, even though free from color and an appreciable odor and taste, and at the same time furnishing a proper lather with a small proportion of soap, may yet have sewage impurities sufficient to render its use extremely dangerous. The *Pharmaceutical Journal* quotes from Heisch a very simple and important test for determining the quality of drinking water, and especially as to its freedom from sewage contamination. This consists in placing a few grains of the best white lump-sugar in half a pint of the water in a perfectly clean, colorless, glass-stoppered bottle, freely exposed to daylight in the window of a warm room. If the water be perfectly free from sewage contamination, it should not become turbid, even after an exposure of a week or ten days, in which case it is almost certainly safe, otherwise not.

A Million Dollar Telescope.—In a recent address before the California Academy of Sciences, Professor George Davidson made the following remarks—words which we are sure will find their way to every quarter of the civilized world, and engender the liveliest pleasure to every lover of science and her advancement : "With a telescope of the largest size and most consummate workmanship that American skill can devise, properly located ten thousand feet above the sea, in the clear skies of the Sierra Nevada, with every variety of apparatus commensurate therewith ; with masters of observation and ingenuity in research ; with ample funds reserved to devise other instruments and methods which those instruments and the highest genius must suggest, we hope, at no distant day, to see solved the mighty problems of creation that are yet beyond our grasp. Such an outfit and such provision have been the lifelong objects of James Lick ; and after much earnest solicitation, I have overcome his shrinking from what he considers vain glory, and obtained his permission to announce to the Academy his intentions, which I have faintly sketched in the preceding sentence. There will be no let or hindrance in carrying out his views ; the amplest means are provided; the rarest skill has been invoked, and the plans are taking definite and practical shape."

The *Mining and Scientific Press*, of San Francisco, of which city Mr. Lick is one of the wealthiest denizens, notes that the scheme, as already indicated by Professor Davidson, is being quietly perfected, and that the geological, meteorological and other peculiarities of various sites of the mountain range above named are soon to be carefully scrutinized and reported upon. A peak will be selected which, from its high altitude and clear surrounding atmosphere, will afford the finest possible view of the heavens throughout the longest period of the year, and there the observatory will be permanently located.

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HOW THE PENNSYLVANIA COMPANY REGULATES TIME.

(From the Toledo Blade.)

The Pennsylvania Company, in the extensive ramifications of its railroad interests, extending largely eastward and westward, has necessarily experienced some embarrassment on account of the difference of time. This may be clearly understood and appreciated when we state that the difference between Chicago and Pittsburgh time is about thirty minutes, and in order to ensure safety in running trains and avoid confusion in the general business, a common time is necessary for the entire system controlled by the Company. Those least conversant with railroad matters can see this at a glance. Accordingly, Columbus time has been adopted as the standard time of the road, but heretofore, although all clocks of the Company have approximated that time, there have been more or less variations, which seemed next to impossible to avoid. To obviate the difficulty, and secure exact correspondence of time throughout the whole extent controlled by them, the officers of the Company have lately adopted and carried into successful operation a system of telegraphic time signals, which we will endeavor to explain:

A telegraphic circuit has been established between the clock of the Allegheny Observatory and the general offices of the Company at Pittsburgh. The observatory is under the management of Prof. S. P. Langley, a well-known scientist of eminent qualifications, and who, it will be remembered, was selected by the Government, two years ago, to direct an expedition into Spain to observe the eclipse of the sun, and investigate various matters in the interest of astronomical science. Professor Langley regulates the clock of the Observatory by astronomical observations, and the pendulum of the clock is so connected with the circuit that the latter is broken and closed at each vibration, and thus regular pulsations of seconds are transmitted over the wire and sounded upon a bell in the telegraph rooms of the general offices. At any time during the day or night the bell may be switched in, and the standard clock corrected to within an infinitessimal part of a second. The arrangement of the mechanism at the Observatory is such that the seconds are beat consecutively until the forty-ninth, inclusive; there is then a pause (closed circuit) of five seconds, followed by a beat of four seconds, then a pause (closed circuit) on the fifty-ninth second, and a beat on the sixtieth second, completing the minute. The pauses are considered as preliminary signals for comparison with clocks, and the beat on the sixtieth second indicate the point where the exact difference can be noticed.

The time is transmitted over all lines of the Company at four P. M. of each day, as follows;

At 3:55 P. M. the operator at Pittsburg signals "Time," (business being suspended on the circuits for ten minutes for the purpose of sending time), and by a number of repetitions of the word "Time" attracts the attention of all operators, near and remote, on the circuits. At or about 3:57 he connects the main lines by automatic repeaters with the Observatory circuit. After such connection is made, the second beats are repeated on the main circuit until 3:58, at which time the mechanism of the Observatory clock opens the circuits and holds them open for one and a half minutes, or until thirty seconds before 4 o'clock. The circuits are then automatically closed and vibrations of seconds return on the thirty-first second. The first pause (closed circuit) of five seconds thereafter, as before described, calls attention to the approaching completion of the minute, and the first beat which follows the pause on the fifty-ninth second, gives the stated hour sharp.

By this process exact Columbus time is transmitted each day, and clocks regulated at Pittsburgh, Mansfield, Crestline, Fort Wayne, Chicago, Toledo, Erie, Ashtabula, Dennison, Columbus, Cincinnati, Indianapolis, Vincennes, Richmond, Ind., Bradford, Logansport, Zanesville, Lancaster and intermediate points. Each division is supplied with a good clock, which is carefully regulated by Observatory time, and with which conductors and employees are instructed to compare their time daily.

Wm. Thaw, the Vice-President of the Company, and Prof. Langley, have been very active in the promotion of this object, and to these gentlemen, seconded by the officers of the departments interested, its complete success is due.

THE AURORA.

The aurora has long been regarded as a mysterious phenomenon, subject to no law, and too capricious to be associated with other appearances. But within the past few years physicists have discovered a certain periodicity in displays of auroræ, and that the grandest occur at intervals of about sixty years. Since then attempts have been made to show a dependence between auroræ and sun-spots, or to connect them with phenomena of magnetism, both of which, as many readers are aware, have an eleven-yearly period of maxima and minima. Professor Loomis, of Cambridge, U. S., who has well considered the question, says, in a recently published paper, we are not to suppose that a black spot on the sun exerts any direct influence on the earth's magnetism or electricity, but that the spot is evidence of some disturbance on the sun's surface, which instantly affects the earth's magnetism, and occasions a flow of electricity wherein the auroral light is produced. It may be that there is a direct flow of electricity from the sun; and if light and heat are the result of vibrations of a rare ether which fills all space, electricity may be assumed to be similarly produced, or to be at least a force capable of being propagated through the ether with a velocity equal to that of light. While traveling through the void celestial spaces, it develops no light; but as soon as it meets the earth's atmosphere, which appears to extend to a height of five hundred miles, it then does develop light, and its movements are controlled by the earth's magnetism, in a manner analogous to the influence of an artificial magnet upon a current of electricity circulating round it.

Thus, we may provisionally accept, as the latest theory on this interesting question, the conclusion that there is some relation between the mean daily range of the magnetic declination and the number of auroræ observed, and that these phenomena, again, are related in some way to the appearance of spots on the sun. It is a theory which may well engage the thoughts of all who take interest in the progress of physical science.—*Chambers' Journal.*

In a paper by Dr. A. H Garrod, the following ingenious hypothesis regarding the production of Nerve Force is advanced. Admitting that the force in question is either identical with, or closely allied to, electricity in its properties, he then asks, where does it originate? The existence of special organs for its development in the torpedo and other creatures which exhibit external electrical phenomena, and the absence of any such organ in man and the higher animals, would seem to indicate that the production of electrity in animals requires some other form of apparatus than the nervous ganglia. In answer to this, the Doctor seeks to show that, in the difference of temperature between the interior and surface of the living body, a source of energy is presented which, on thermo-electric principles, is capable of producing all the force required. The brain and minor ganglia, he adds, would then act as offices for the reception and transmission of currents in the required directions, being in fact the commutators of the system.

In support of this the Doctor says: "There are several of the most important phenomena exhibited by the nervous system which are very satisfactorily explained on the above hypothesis. For instance, in cold weather the impulse to action is much more powerfully felt than in Summer, when the air is hot, and therefore the temperature of the surface is higher. It is well known that it is impossible to remain for more than a very short time in a hot-water bath of which the temperature is as high as, or a little higher than that of the body, on account of the faintness which is sure to come on, and this may be reasonably supposed to be the result of the cessation of the nerve-current, which is consequent on the temperature of the surface of the body becoming the same as that of the interior. This faintness is immediately recovered from by the application of a cold douche. When great muscular exertion has to be sustained, as in swimming or rowing, it is always necessary to have the clothes very thin, and it is felt during the time that it is necessary for the continuance of the effort that the surface of the body must be kept cool."—*Scribner's.*

A letter from Nordenskjöld, the Arctic explorer, dated Mussel Bay, Spitzbergen, September 9, 1872, giving an account of some interesting observations on the presence of iron dust in the atmosphere, has just been published in "Comptes Rendus," from which we translate as follows: In December, 1871, there occurred the heaviest fall of snow of which we have any record. It snowed incessantly for five or six days, and many lives were lost in the capital. Supposing that the impurities floating in the atmosphere would be brought down with the snow of the first two days, I waited till the storm was over, and then collected, with all due care, a quantity of the superficial snow and melted it, with a view to ascertain whether it contained any solid matter. To my great surprise I observed that this snow had a large amount of black sooty dust, consisting of an organic substance rich in carbon. This substance is of the same nature as the meteoric dust which fell simultaneously with meteorites, properly so called, at Hessle, near Upsal, on the 1st of January, 1868.

It is just possible that the carbonaceous matter came from the chimneys of Stockholm and the metallic iron from the roofs of the houses, most of which are of iron in that city. Still, considering the matter as one worthy of study, I wrote to my brother, Carl Nordenskjöld, who lives far away from cities, in the interior of Finland, and who takes an interest in meteorology, and asked him to repeat my experiment. After having removed the chief causes of error, and collected the snow in a plain surrounded by forests, he too found a black dust, which he sent to me. Analysis showed that it was of the same nature as that of Stockholm, and from both the magnets extracted particles which were recognized as metallic iron.

In St. Andrew's Church, Dublin, an excessive reverbertion of sound has been checked by stretching wires across the building.

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ELECTRICITY AND DEATH.

Lecture before the London Society, by BENJAMIN W. RICHARDSON, M. A., M. D., F. R. S.

The object of the lecture was to put forward certain facts the author had learned on the phenomenon of muscular irritability after systematic death. He included in the same study certain examples in which muscular irritability has for a time ceased, but has become re-developed under new conditions. He thus included the study of those states which favor the continuance of irritability or which destroy it, and those conditions which suspend it, but do not destroy it. By this the effect of electrical excitation is in the same direction, but is varied according to the mode in which the excitation is performed. Discharge from the Leyden jar produces contraction, which is permanent or intermittent in accordance with the mass of the muscle and the intensity of the discharge. This fact was elucidated by reference to a series of experiment with a Leyden battery, placed in cascade, and the effect produced by the discharge from 96 feet of surface upon animals of different sizes and weights, from sheep down to pigeons, as well as on sections of the bodies of the same animals immediately after death. The experimental facts demonstrated that with an efficient discharge the whole muscular system of a small animal could be fixed instantly in the rigidity of death, and that the precise position of the animal at the period immediately preceding death was retained with such perfection, so sudden was the change, that nothing but physical examination by the hand could bring to the mind the fact that the animal had passed from life into death.

But the same shock passed through a sheep weighing 54 pounds produced only a temporary contraction of muscle, and required repetition before the rigidity was rendered permanent.

By employing discharges of less tension, it was found that muscles, or special tracts of muscles, in the same animal immediately after its death, could be made rigid quickly or slowly by variation of the intensity of the discharge.

The effect of the intermittent electro-magnetic current was next brought forward, and was shown to resemble closely that of the simple electrical discharge from the Leyden phial.

Intensified, it induces permanent contraction ; and if it be repeated even with low tension, so as to call forth contraction, it destroys the irritability, *cæteris paribus*, more quickly than if the muscle had been left to itself.

Parenthetically, the lecturer dwelt here on the common practice, after sudden death, of endeavoring to excite the action of the enfeebled heart by passing through it an electrical current. Some practitioners, said the author, have gone so far as to introduce a needle into the heart itself, and to make the needle act as one of the conductors from a battery. Such experimentalists, before they undertake this operation on the human subject, should at least observe the effect of the agency they are employing on the exposed heart of an inferior animal recently and suddenly killed by drowning or by a narcotic vapor. They would learn then with what infinite facility the muscular irritability of the heart, in all its parts, is excited for a moment only to be permanently destroyed. They would learn that, if blood be not passing through the muscular structure concurrently with their exciting current, they could not more effectually arrest function than by the very method they have adopted to sustain it.

The influence of the continuous current on muscular irritability was introduced by the author, together with a special reference to the first experiments of Aldini on the bodies of malefactors who had been recently executed ; and it was shown from Aldini's most noted experiment how largely the phenomena of motion he induced in a dead man, and the recital of which caused so much sensation in the year 1803, was due, not to the galvanism, but to the circumstance that the dead body had been exposed for the hour after death and before the experiments commenced, to the action of cold 2° below freezing point. On the whole, the continuous current acts on muscular fibre after the manner of heat. If the muscle, recently dead, be exposed to cold, the current, when sufficient, restores, for a limited period, the irritability, and finally destroys it by inducing persistent contraction. If the muscle, recently dead, be left at its natural temperature, the current shortens the period of irritability by quickening contraction.

ELECTRO-MUSIC REPORTER.

A novel application of electricity to musical instruments for the purpose of recording the inspirations of genius in musical compositions, is now in process of construction for Mr. C. T. Shelton, of New Haven, Conn. It is a telegraphic attachment to an organ. Beneath each note of the three manuals and of the pedals, and connected with each stop of the organ, is a small brass spring, which is pressed down whenever the piece to which it is attached is brought into action. From each spring, wires run to a galvanic battery of twelve cells, and to the recording apparatus, which may be situated at any convenient distance from the organ. When the spring is pressed down, connection between the battery and the recording apparatus is formed, and the electric current passes through. The recording apparatus is very simple, and similar to that used in Morse's telegraph. Attached to the clockwork, by which a uniform motion is produced, are two cylinders some eighteen inches in length, between which is carried a strip of paper divided into about 250 longitudinal divisions—one for each note and stop in the organ. Corresponding to each of these divisions is a magnet whose armature carries a lever armed with a style, which indents the paper as long as the electric current is passing through. Now, when any note or stop is brought into action the spring connected with it is pressed down, the circuit is completed, the corresponding armature is attracted to its magnet, and the division of the paper belonging to the note struck is indented with a line proportionate in length to the time during which the note is held down. A staccato touch will be represented by a simple dot, while a longer tone will be recorded by a more prolonged indentation. The clockwork is so geared that the paper is carried forward on the rollers at the rate of about one half an inch per second, thus recording each note in the most rapid playing at the rate of about ten notes per second by a line one twentieth of an inch in length, and longer notes by lines proportionally extended.—*Scientific American.*

THE delay in the completion of the West India and Panama system is a notable disappointment. Two of the cables have already been repaired by the steamer Investigator, but the line between Martinique and Dominica—a distance of forty miles—is still bridged over by a schooner service. This, with the delay on the Cuba section, interferes with the perfect organization of the rich traffic which unquestionably awaits the complete opening out of the West Indian system. Another adverse event of the month has been the check in perfecting the first section of the Brazil cable. The expedition to submerge the second section of this line from Madeira to St. Vincent left the Thames about the 14th ult., and the work is expected to be completed before the close of the year.

SEVERAL geese died in Mormon Island, Cal., a few days ago, and, upon dissection, gold dust was discovered "in fatal quantities" in their gizzards. And yet there was no suspicion that either of these was the golden goose we hear so much about.

AMERICAN INVENTIONS IN ENGLAND.—The Midland Railway of England is fitting up four trains, including fourteen Pullman cars, with Olmstead's electric brake, which Mr. W. B. Chapin is introducing. The cars are also fitted with Miller platforms, and with the Allen paper wheels, which have Krupp's crucible steel tires, costing, it is said, £20 each. The electric brake, it is said, is being tried on the Southwestern and North British lines, and will be tried on roads in France, Russia, Austria, Norway and South America. It was used for some time in this country on the Chicago, Burlington & Quincy and Providence & Worcester roads, though we believe that it has been improved somewhat of late.

How can I make an electro-magnet to be operated by an earth battery ? Answer : You can make an earth battery by sinking two large plates of copper and zinc in moist earth, and connecting them by conducting insulated wires attached to each. Such a battery was constructed by Bain in 1841. You can make an electro-magnet by winding stout copper wire, covered with silk, around a piece of soft iron bent in the form of a horse shoe, care being taken that the coils are wound in the same direction around each bobbin, either from or towards the axis of the magnet. The more numerous the coils, and the greater the power of the electric current, the stronger the magnet.

THE Lexington Avenue Synagogue is lighted by induced electricity, produced by a new frictional apparatus and condenser, contained in one small case. The electricity, generated by turning a crank, is stored up in the condenser, which, when a sufficient quantity and intensity is arrived at (depending upon the number of burners to be lighted), is discharged, producing a spark at each burner—the circuit being there broken—and ignites the gas which has been turned on immediately before the discharge.

THE Brazilian Submarine Telegraph Company have announced a postponement of the opening of the Lisbon and Madeira section of their line. The cable was laid between Lisbon and Madeira on the 19th of September, but the section proved imperfect, owing to the development of a fault. On the 26th ult. the cable, in an attempt to recover it, was broken, and owing to the subsequent continual bad weather and loss of grapnel rope, the contractors have for the present ceased further operations.

IT is announced in the *Buenos Ayres Standard* that the great event in Uruguay was the opening (which took place on the 12th September last) of the land lines of the Brazil and River Plate Telegraph Company (Companhia Telegraphica Platino Brazileira), represented in London by Messrs. Grant Brothers & Co., of Lombard street. The lines were working most successfully, the first day's messages having amounted to the satisfactory number of 120, which considerably exceeded the expectations of the company.

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TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 BROADWAY, NEW YORK,
December 1, 1873.

To all Offices on W. U. Lines:

The following additions and changes have been made since the date of the last Circular:

GENERAL INFORMATION.

Coopers, Ala., closed.
Wilhites, Ala., closed.
Marianna, Ark., re-opened.
* Fort Yuma, Arizona.... 100 8 San Diego, Cal., check San Francisco.
* Marcicopa Wells, Arizona..... ....100 8 " "
* Phœnix, Arizona.....100 8 " "
* Prescott " .....100 8 " "
* Wickenburg " .....100 8 " "

Offices will enter the points in Arizona named above on page 5 of the tariff book.

Aptos, Cal., closed.
Boca, Cal., re-opened.
Maine Prairie, Cal., closed.
Menlo Park and Mountain View, Cal., are now W. U. offices.
Mokelumne Station, Cal., changed to Lodi.
San Luis Ranch, Cal., closed.
Vaca Station, Cal., changed to Elmira.
Yountville, Cal., re-opened.
East Killingly and Northford, Conn., closed.
Malad, Idaho, re-opened.
The P. O. A. of Lynn, Ill., is Lynn Centre, Henry Co.
Lima, Ind., closed.
Port Allen, Iowa, closed.
De Soto, Ks., closed.
Petersburg, Ks., changed to Kinsley.
West Point, Ky., closed.

On and after December 8, Bangor, Me., will be in square 11, instead of 10 as heretofore.

Plane No. 4, Md., closed. Business will hereafter be sent and checked to Mt. Airy.
Ashland, Md., closed.
Cockeysville, Md., closed.
Phenix Sta., Md., closed.
Cohasset, Mass., closed.
North Adams, Mich., closed.
Como, Miss.. re-opened.
Glenbrook, Nev., closed.
Deep Creek, Nev., closed.
Kingston, N. B., closed.
Wortendyke, N. J., closed.
The P. O. A. of State Line, N. Y., is Northville, Erie Co., Pa.
East Hampton, L. I., N. Y., closed. Messages are delivered from Sag Harbor, L. I. Charges for delivery, $3 special, or 25 cents by stage.
Hereafter, business for Gorham, Pine Valley, and Starkey, N. Y., will be sent via Canandaigua, N. Y., only.
Abbottsburg, N. C., reopened, square 116.
Cartwrights, Oregon, closed.
Estes Ranch, Oregon, closed.
Grant's Pass, Oregon, closed.
Marion Sta., Oregon, closed.
Milwaukee, Oregon, closed.
Bear Valley, Pa., closed.
Moorheads, Pa., closed.
Torresdale, Pa., closed.
Clinton, Lawrence Co., Pa., closed.
Business for Port Royal, S. C., will hereafter be checked direct.
Ophir, Utah, closed.
Martinez, Utah, closed.
Monticello, W. T., closed.
Kidders Camp, W. T., closed.
English Camp, W. T., closed.
Hatt's Camp, W. T., re-opened.

NEW OFFICES.

412 Baring Cross, Ark.
412 Benton, Ark.
431 Malvern, Ark.
* Arcata Point, Cal.....100 8 Petaluma, Cal., check San Francisco.
* Arenas, Cal.....100 8 Petaluma, Cal., check San Francisco.
Butchertown, Cal.
Berkeley, Cal.
Delano, Cal.
Deaf and Dumb Asylum, Cal.
Elmira, Cal.
* Eureka, Cal.....100 8 Petaluma, Cal., check San Francisco.
* Fermdale, Cal.....100 8 Petaluma, Cal., check San Francisco.
Gordon's Station, Cal.
Lodi, Cal.
Mills Seminary, Cal.
* Mendocino City, Cal....100 8 Petaluma, Cal., check San Francisco.
New York House, Cal.
National City, Cal.....100 8 San Diego, Cal., ck. San Francisco.
Petrolia, Cal.....100 8 Petaluma, Cal., check San Francisco.
Plymouth, Cal.
Purissima, Cal.
Roseville Junc., Cal.
Walnut Grove, Cal.
848 Bethalto, Ill.
878 Mellville, Ill.
299 Hillsdale, Ind.
530 Kinsley, Ks.
* Clear Spring, Md.....25 2 103 Hancock, Md.
Camp 18, Nevada.
Cherry Creek Mill, Nevada.
Mound House, Nevada.
White River, Nevada.
* Grande Anse, N. B....30 2 3 Sackville, Mont. Co.
* Cherubusco, N. Y.....25 1 38 Montreal Junc., Mont. Co.
* Colton, N. Y.....25 1 38 Montreal Junc., Mont. Co.
* Crary's Mills, N. Y...25 1 74 Oswego, N. Y., Mont. Co.
* East Sandy Cr'k, N. Y.25 1 57 Utica, N. Y., Mont. Co.
* Ft. Jackson, N. Y.....25 1 38 Montreal Junc., Mont. Co
40 Germantown, N. Y.
* Harrisville, N. Y..... 25 1 74 Oswego, N. Y., Mont. Co.
* Hopkinton, N. Y.....25 1 38 Montreal Junc., Mont. Co.
* Lawrenceville, N. Y...25 1 38 Montreal Junc., Mont. Co.
* New Haven, N. Y.....25 1 74 Oswego, N. Y., Mont. Co.
* Nicholville, N. Y..... 25 1 38 Montreal Junc., Mont. Co.
* Parishville, N. Y.....25 1 38 " "
* Richville Village, N. Y.25 1 74 Oswego, N. Y., Mont Co.

* Portland, Jackson Co.	60	4	233	Cincinnati, O.
	50	3	213	Chillicothe, O.
	50	3	181	Marietta, O.
	40	3	213	Portsmouth, O.
* Norwood, O.	80	2	233	Cincinnati, O.
	50	3	213	Chillicothe, O.
	60	4	181	Marietta, O.
	60	4	213	Portsmouth, O.
* Westboro, O.	65	5	213	Cincinnati, O.
	75	5	213	Chillicothe, O.
	95	7	181	Marietta, O.

Allandale, Ont.
Allenford, "
Alliston, "
Arnott, "
Arnprior Station, Ont.
Bolsover, "
Bondhead, "
Bothwell Station, "
Bronte, "
Brussels, "
Burritt's Rapids, "
Caledonia Springs, "
Camden East, "
Carlton Place Station, Ont.
Clarksville, "
Coboconk, "
Colchester, "
Colebrooke, "
Corinth, "
Cross Hill, "
Darling Road, "
Delhi, "
Dickinson Landing Station, Ont.
Dorchester, Ont.
Eden, "
Eden Mills, "
Eldon, "
Flesherton, "
Florence, "
Foys, "
Glenallen, "
Glencoe Sta., "
Haliburton, "
Harrow, "
Harrowsmith, "
Hawkesville, "
Hollin, "
Jarvis, "
Kemptville Station, Ont.
Keenansville, "
Kerwood, "
Kettleby, "
Kingsville, Ontario.
Kinmount, "
Kirkfield, "
Leamington, "
Linwood, "
Lisgar, "
Lloydtown, "
Longford Mills, "
Markham, "
Marshville, Ont.
Maxwell, "
Mildmay, "
Mill Bank, "
Milverton, "
Minden, "
Moorfield, "
Morrisburg Station, Ont.
Mount Elgin, "
Nicolston, "
Orchardville, "
Palmer's Rapids, "
Palmerston, "
Petworth, "
Port Albert, "
Priceville, "
Renfrew Station, "
Rosemount, "
Rothsay, "
Ruthven, "
Schomberg, "
Sebringville, "
Seeley's Bay, "
Singhamton, "
Sydenham, "
Tottenham, "
Tyrconnell, Ont.
Upper Brewers Mills, Ont.
Victoria Road, "
Wallacetown, "
Weston Sta., "
Woodford, "
Woodville Junc., "
Yarker, "

140 Naples, Pa., P. O. A. is Sandy Lake, Mercer Co., Pa.
121 Reynoldsville, Pa.
150 Summit, Crawford Co., Pa., P. O. A. is Centre Road Station, Pa.
47 Schencks, Pa., P. O. A. is Bridgewater, Bucks Co., Pa.
84 Trevorton, Pa.
* Adamsville, Quebec. Riviere Trois Pistoles, Quebec.
* Chaudiere Sta., " St. Bruno, "
* Danby, " St. Janvier, "
* Dechene, " St. Jean Baptiste, near Montreal, Quebec.
* Desert Village, " St. Rose, Quebec.
* Drew's Mills, " St. Thérése, "
* Greenville Wharf, Que. Stukeley Mills, "
* Kazubazua, " Trois Pistoles Sta., Que.
* L'Islet Station, " Varennes, "
* Lyster, " Masson College, Terrebonne, Que.
* New Glasgow, Que. Vercheres, Que.
* Perth, " Victoria Farm, Que.
* Pickanock, "
* Arcadia, Wis..... ...75 5 307 Chicago, Ill.
* Kewaskum, Wis.... ....35 2 307 "
* Roberts, Wis.....100 7 307 "

The following revised list of offices and tariffs of the Marietta and Cincinnati Telegraph line has been received:

The rate for additional words is the same as that on W. U. Lines.	Cincinnati, O. 233	Chillicothe, O. 213	Marietta, O. 181	Portsmouth, O. 213
Cumminsville	25	50	60	60
Blanchester	40	50	60	60
Big Run	60	50	30	60
Greenfield	50	30	60	60
Hamden	60	40	50	50
Hillsboro	75	85	95	
Jackson, Jackson Co.	60	40	50	40
Leesburg	50	40	60	60
Frankfort	50	30	60	50
Londonderry	60	30	50	50
Lynchburg	75	85	85	
Maderia	30	50	60	60
Madisonville	30	50	60	60
Martinsville	40	40	60	60
Mineral City	60	50	40	50
Monroe Furnace	60	50	60	40
New England	60	50	40	50
New Vienna	50	40	60	60
Raysville	60	:0	50	50
Scott's Landing	60	50	25	60
Sciotoville	50	40	60	25
Vincents	60	50	30	60
Webster	60	50	60	30
Zaleski	60	40	50	50

The "tariff for this line," for offices in Indiana, Kentuck, and West Virginia, on business to or from Quebec and Ontario should be 85 and 6, not 85 and 5, as given in JOURNAL of August 15th, 1873.

SPECIAL RATE OFFICES.

The tariff to Treverton, Pa., is 25 cents more than "special rate" to Philadelphia, and to Milwaukee Stock Yards, Wis., same as "special rate" to Milwaukee.

ATLANTIC CABLE BUSINESS.

We are notified of the following change in rates on Atlantic Cable Business.

	For 10 words.	For 20 words.
Aden—(Messages above 10 words are charged the 20 word rate)	$10 00	$15 00
Greece via Falmouth		4 75
Candia—Canea, Retimo via Falmouth and Corfu		6 38
Japan—Hiogo, Osaka, Simonosaki, Yeddo or Yokohama via Falmouth, Teheran or Siberia		42 62
———Ditto, if written in Code or Cypher		44 88

Ceylon via Falmouth or Teheran, $10.50 for 10 words and $1.05 for each additional word.

India—West of Chittagong, including Kurrachee via Falmouth or Teheran, $10. for 10 words and $1. for each additional word.

India—East of Chittagong via Falmouth or Teheran, $10.50 for 10 words and $1.05 for each additional word.

On Messages to China and Japan, the words "Via Siberia," when inserted, must be charged for beyond London.

CUBA CABLE BUSINESS.

We are notified, that the words "Care of Nunes," may hereafter be dispensed with as part of the address in messages intended for transmission by the Colon (Aspinwall), Cable.

In messages destined for points reached by that Cable, but not intended to be forwarded by telegraph beyond Jamaica, the words, "Post Jamaica," must be inserted and charged for.

WILLIAM ORTON, *President.*

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

ONE DOLLAR PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, DECEMBER 1, 1873.

THE POSTMASTER-GENERAL'S REPORT.

Whatever may be Mr. Cresswell's merits, his treatment of the Postal Telegraph scheme in his coming report will not elevate the public conception of his fitness for his high trust. The extract from it now before us, indeed, fills us with a surprise almost sorrowful. We venture to say, that, as a public document, it will be found unique in its weakness, a weakness which its author will be made to feel. Instead of the calm argument of fact and policy which a State officer, taking an unimpassioned view of the circumstances of the nation, is expected to employ, and which, when stated with dignity and justice, never fails to elevate the tone of public sentiment with respect to the general administration of public affairs, we have a personal, infelicitous, and what appeares to us, vindictive attack upon the Western Union Telegraph Company, and its chief executive officer. Nor is this apparent vindictiveness less prominent than its inaccuracy. Its statements are, indeed, so incorrect, and that, too, in the face of the most easily ascertained facts, as would, in ordinary circumstances, challenge, on our part, the pity of silence, but which, coming from such a source, seems to ask a word of notice at our hands.

In the extract before us the report opens with the following words: "The Western Union Company has always contended for high rates, and enforced them with a high hand." Now, this is alike untrue and sensational. What does Mr. Cresswell mean by enforcing rates "with a high hand?" Are there degrees of administration by which the hand of authority is heightened or depressed? Is it a "high hand" which demands three cents for a posted letter, and casts it back if unpaid? Mr. Cresswell must pardon us, but the expression sounds to us like that of a man irritated by opposition to a pet personal conceit, and alike undignified and sensational. It seems used with a design to express the existence of a power in the way of public justice. And yet no one knows better than Mr. Cresswell that in the matter of rates, the policy of the Western Union Company has been one of steady and rapid reduction. The average message to-day is only half the amount of six years ago. The policy of the Company is now, and always has been, to establish such a basis of rates, as shall make every charge strictly just to the public, and yet affording a fair return to those whose capital has provided the lines. Mr. Creswell may deny the truth of this, yet it is strictly correct, and the proof thereof is ready and abundant.

Here is another extract, so incorrect as to be simply puerile:

"When new associations have been formed for the purpose of reducing rates, the Western Union Company has at once entered the lists to destroy its rivals, and in pursuit of victory has not scrupled to use any device which the powerful can employ against the weak. Failing to vanquish its adversary in the open field of fair competition, it has resorted to artifice, and triumphed by making gold its weapon. Thus it has acquired, by lease or purchase, lines of the American Telegraph Company, the Illinois and Mississippi Company, the Chicago and Mississippi Company, and the California State Company, and during the past year it has obtained control of the International Ocean and Pacific and Atlantic Companies."

Now, those who know the relations of all but two of the companies named, and which are thus stated as having been originated to reduce rates, and against which the Western Union Company is represented as "entering the lists," low rates in one hand and gold in the other, to destroy them, will smile at the amazing ignorance thus exposed. Aside from the Chicago and Mississippi and Pacific and Atlantic companies, every other company named was originated, has always acted in concert with, and as the regular connections of the Western Union Company, and in no sense and never in opposition. They occupied entirely distinct territory. They were united by common consent to secure uniformity of administration and directness and cheapness of transmission. As to the exceptions named, the Chicago and Mississippi Company occupied a limited territory on the north of Missouri, and the control of the Pacific and Atlantic was accomplished by voluntary personal offers of stock by large holders on terms which commended the purchase, and in which no pressure whatever was to the least degree employed. These are facts which were within Mr. Creswell's power to obtain from sources which would have been freely opened to him. They are, indeed, mainly facts of general public knowledge. Ignorance of them in the preparation of a great national paper on so grave a theme seems, at least, extraordinary.

Is it any use to follow a document which in its few opening lines commits such huge affronts on intelligence and truth? We venture to say that, with no wish to disparage Mr. Creswell, no public paper has appeared for many years, if ever, which has, at least in the treatment of this matter, so exposed its author to public rebuke. It will fall, as all such presentations fall, by the gravity of its own weakness, burying with it the whole scheme it was written to subserve, and that, too, with sadly attenuated hopes of any speedy resurrection. For ourselves we deeply regret the publication of such a report. It detracts from the dignity of public station. It soils the ermine of administration. It disturbs the respect which should encircle official position. Surely this vast nation does not need and does not deserve such aid to accomplish designs officially presented as necessary to the public weal.

In answer to inquiries, we are sorry to state that the Editor of the JOURNAL, Mr. Grace, has been confined to his house, Scotch Plains, N. J., for the past six weeks or more, by an injury caused by a fall, from which, however, he is rapidly recovering.

ST. JOHNS, N. F., Nov. 21.—The telegraph cable steamer "Robert Lowe," the property of the Anglo-American Telegraph Company, was lost near St. Shotts, St. Mary's Bay, on Wednesday, November 19. The chief officer and two boats' crews were saved. The captain's and two other boats are missing. The tug steamer "Cabot" has been dispatched to assist the missing boats.

THE success of Stearns' Duplex Telegraph in Europe widens, as we knew it would wherever its merits were honestly canvassed and a fair opportunity given to prove its value.

We now learn that Mr. Stearns has arranged for a Duplex line between London and Amsterdam, and which is no doubt already in operation. In December, the Duplex will be applied to the line between London and Paris. About the same time it will be connected with the main lines in Belgium and in Austria.

In *Meteorological Science* it is probable that an epoch of great importance has been reached in the unanimous agreement of the congress which was in session at Vienna from the 2d to the 15th of September as to the importance of taking at least one synchronous observation of the weather daily at all possible stations throughout the entire world. It will be seen that this idea, if successfuly carried into effect, is but a grand extension of the system of tri-daily synchronous observations which has been in operation for three years in the Army Signal-office. The result arrived at in the Vienna congress is to a considerable extent due to the efforts of Brigadier-General Albert J. Myer, Chief Signal-officer, U. S. A.

AN editor, of course, is supposed to know everything, but, if he is to die outside a lunatic asylum, he ought to be protected against the propounders of questions like this: "A strong man is suddenly struck dead by lightning. What has become of the potential energy he possessed before he was struck?" The editor so cruelly assailed was equal to the occasion; but have any of our readers sufficient potential energy to unriddle the mystery for themselves? We doubt it, and, giving them the benefit of that doubt, beg to inform them that his potential energy would be where it was before—within the space bounded by his external surface! What the lightning has done, has been to destroy the mechanism for its realization. A small portion of the man's potential energy might have been converted into actual energy by the lightning, as, for instance, in the shape of heat; but the great bulk would be got by anybody who chose to eat his body. How potential energy must accumulate amongst canibals! We have heard some odd apologies for man-eating, but Sidney Smith himself could scarce have bettered this scientific justification of a weakness for cold missionary.

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EXECUTIVE OFFCE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, Nov. 25th, 1873.

Gen. ANSON STAGER,
Gen. T. T. ECKERT,
JNO. VAN HERNE,
JAMES GAMBLE,
Gen'l Supts.

On Thursday the 27th inst., on Thursday December 25th, and on Thursday, January 1st, office hours will be from 8 to 10 o'clock A. M. and from 4 to 6 P. M., except at repeating stations and at principal offices, which will be kept open as usual, but with such reduction of force on duty, as circumstances may permit.

WM. ORTON,
President.

OTHER LINE BUSINESS.—OFFICIAL.

Notices of non-collection of charges upon "collect" messages originating at other line offices, and office messages in regard to special delivery charges upon messages to or from other line offices, should always be addressed to the CONNECTING office, and not direct to the other line office.

Notices of non-delivery, and requests for better address, should, however, always be addressed direct to the ORIGINATING office.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
NEW YORK, Nov. 22, 1873.

On December 1st, Virginia City, Mont., in W. B. Hibbard's district, will be closed as a money order office.

CORRECTION.

For *Greensbury, Pa.*, in last issue of JOURNAL, read *Greensburg, Pa.*

G. H. MUMFORD, Vice Pres't.

CHARLES HOWARD, the absconding telegraph operator at the Sylvan Lake Mines, Beekman, N. Y., took the steamer for England, and will probably be arrested on the other side.

We regret to have to announce the death of the wife of Mr. C. H. Summers, Electrician of the Central Division of the Western Union Telegraph Co., November 22d, at Highwood, Illinois.

THE JOURNAL OF THE TELEGRAPH will commence its Seventh Volume with the issue of January 1, 1874. The price of subscription will be $2. Particulars will be given in our next.

Subscribers to Vol. VI. will receive the December numbers without extra charge.

The lists of deaths in the ranks of men of science has recently been unprecedentedly large. We have before mentioned those of Professors Coste and J. Chacornac, and now add to them Professor Donati, director of the Astronomical Observatory at Florence, who died of cholera on the 20th of September at Vienna, and Professor Czermak, an eminent physiologist, who died at Leipsic on the 18th of September. The latter is well known for his special physiological researches, and particularly by being in great part the inventor of the laryngoscope.

A SUM of money is voted annually by Parliament for scientific instruction in the United Kingdom; the object of the grant being to promote instruction in science, especially among the industrial classes, by affording a limited and partial aid or stimulus towards the founding and maintenance of science schools and classes. The following are among the sciences towards instruction in which aid is given: Acoustics, Light, Heat, Magnetism and Electricity: Inorganic Chemistry, Organic Chemistry, Geology, Mineralogy, Mining, Metallurgy.

FOR TARIFF BUREAU CIRCULAR see page 391.

A large amount of matter has been crowded out of the present number.

DURING the late cash panic sale at Claflin & Co.'s, New York, the number of telegraph messages sent and received at the Claflin branch office was 629. Total amount of business done, $583.75.

WE are glad to welcome the *Popular Science Monthly* on the list of our exchanges. In comeliness of form, in typography, in the high field it occupies, and the manner of its occupation, it is an honor to our current literature, and challenges a large support.

ELECTRIC APPARATUS FOR INDICATING LEAKAGE IN SHIPS.—Sortais has devised an electrical apparatus to be placed in the hold of ships for the purpose of giving warning in case of a leakage. On the entrance of the water a current is established, and notice thus given to the officers.

THOSE who have delicate galvanometers should be careful to see that they are not kept in the field of permanent magnets, unless, as in the case of the mariner's compass, they are free to move in the direction of the lines of forces of the magnetic field in which they lie, otherwise they will quickly lose their magnetism. (W. H. Preece.)—*Scribner.*

IN Marshall, Texas, out of 78 cases of yellow fever, 62 died. A large portion of the population fled, leaving few behind, except the sick. Of the 16 who recovered, was operator M. M. Bond, who informs us that Supt. L'Hommedieu nobly risked his life by waiting upon him and others during their illness, and, in the absence of clergymen, performed the burial services at the graves of the dead. God will honor all such true men.

MM. TOMMASI and MICHEL propose a new method of pneumatic telegraph for parcels. In place of driving the boxes containing the parcels by compressed air they propose the use of ammoniacal gas. By the action of heat on aqua ammonia at one end of the tube the ammonia is evolved, and by its pressure urges the box forward; at the same time, by the action of cold water at the opposite end of the tube, the ammonia in front of the tube is absorbed, a vacuum produced, and the parcel acted on by traction as it were. The tube being always full of ammonia, and the same supply being used over and over, it is supposed that a sufficient economy in working pneumatic tubes may be obtained to render their general introduction possible.

DEATH OF A WELL KNOWN TELEGRAPH OPERATOR.—Intelligence has been received of the death, from pneumonia, on the 10th inst., at St. Louis, of Mr. C. W. Hill, a well known telegraph operator, who was stationed in Baltimore in 1870, as manager of the Insulated line from Boston to Washington, the building of which Mr. Hill superintended from New York to Washington. Although but thirty-seven years of age, he had been twenty years in the service of the Western Union Telegraph Company up to 1868. He was one of the oldest operators, and one of the best. He leaves a wife and three children, who reside in Baltimore. Mr. Hill was a native of Rochester, New York, and his remains will be brought here for interment.—*Baltimore Sun*, Oct. 14, 1873.

NOTES AND QUERIES.

Suppose we should take in a message of twelve words at 50 and 3; total, 56c. Should we collect 55c. or 60c.?

Answer in JOURNAL, *Nov.* 1.—Collect 56c.

Now, "down South" we have no change smaller than 5c. Please be a little more explicit in next number of your JOURNAL, as cases of this kind are of frequent occurrence with us.

Very truly yours,
R. T. RAOUL, Operator.

Answer.—The Company requires 56 cents from you. You will have to charge 60 cents to make yourself whole. We would have answered thus had the case been fully stated at first. Still, there is this to be said: No just man would take advantage of this and charge the same person twice in the same manner. There is usually a way of adjusting these things equitably. The right is clear to average charges, so as to protect yourself.

DOMINICK, N. Y.—In receiving a message over the counter, directed "John Smith, Squillville, N. Y., by mail or train from Syracuse, N. Y., should any part of the address be counted? If so, how many words in the above address?

Answer.—Practice has allowed the addition to the address above given as a part thereof. Postage, of course, has to be added to tariff and stated in check.

TAWAS CITY, Mich., Nov. 7, 1873.—Suppose a message was sent from Tawas City, Mich., to Maustin, Wis., via Chicago, at half rate, charge by this line to Chicago 38c., and 30c. for other line. Bay City, Mich., a repeating office, refused to accept of message unless full rates were paid; message was sent after 7 P. M.; then I only asked half rate to Chicago, and other line will be paid full rate, and the last was refused. Was Bay City right in refusing to accept the message at half rate? Answer through your columns, and oblige,

Yours respectfully,
A. DE PERWINOFF, *Manager.*

Answer.—The facts are these. Maustin, Wisconsin, is an office of the Northwestern Telegraph Co. That company refuses to do half-rate business. The Western Union Co. does no half-rate business on messages going to other lines which do not transmit on half rates. You, therefore, were in error in accepting the message on any terms short of full rates for both lines.

Bay City had, strictly speaking, no right to arrest a message on its transit. Had he, however, accepted it, you would have been called upon to pay the difference by the Chicago office.

Please inform me, in your next issue, the number of ohms required in good relays, to work in a circuit of six and 100 miles of line, in order to work with a small battery power?

Answer.—About 100 ohms.

Supposing a message is received at our office with no better address than Mr. John Dunn, he being a stranger and address not known to us. Should we send a boy to inquire at the two hotels (within office limits), or wait and send for better address from originating office? Two "Oprs" had a dispute about this and would like an answer in JOURNAL.

Ans.—Much is necessarily left to the good sense of managers. If sending a messenger to two hotels within office limits could effect delivery, it would, of course, save time to the line and its recipient. Yet, in receiving such a message from an originating office direct, a full address should have been asked. We think offices accepting such messages should be reported.

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TELEGRAPHERS' MUTUAL LIFE INSURANCE ASSOCIATION.

ACKNOWLEDGEMENT OF RECEIPTS FOR ASSESSMENTS NOS. 47 AND 48, UP TO NOVEMBER 20.

25, 42, 44, 69, 185, 186, 187, 274, 294, 347, 425, 515, 692, 695, 697, 700, 705, 766, 842, 996, 1071, 1134, 1135, 1136, 1204, 1208, 1277, 1278, 1279, 1368, 1400, 1439, 1504, 1515, 1556, 1557, 1570, 1609, 1613, 1669, 1670, 1710, 1722, 1726, 1727, 1741, 1742, 1778, 1779, 1807, 1808, 1815, 1827, 1848, 1854, 1916, 1929, 1930, 1938, 1945, 1946, 1947, 1948, 1967, 1968, 2016, 2018, 2025, 2038, 2063, 2064, 2066.

ASSESSMENTS NOS. 49, 50, 51 AND 52.

4, 6, 13, 16, 26, 44, 52, 54, 55, 56, 60, 61, 64, 70, 74, 86, 89, 98, 99, 111, 122, 129. 133, 134, 141, 142, 143, 144, 146, 148, 153, 154, 156, 157, 158, 160, 164, 169, 175, 181, 183, 188, 189, 190, 191, 193, 197, 198, 200, 211, 213, 217, 218, 228, 235, 244, 245, 255, 257, 267, 269, 274, 276, 278, 279, 280, 281, 282, 283, 285, 301, 302, 311, 312, 319, 323, 341, 344, 346, 349, 351, 352, 353, 361, 378, 381, 383, 391, 394, 402, 405, 406, 413, 416, 425, 426, 430, 434, 438, 456, 467, 478, 509, 510, 526, 532, 533, 536, 548, 549, 554, 574, 575, 576, 577, 579, 586, 587, 597, 600, 603, 622, 630, 642, 646, 655, 662, 663, 664, 665, 669, 670, 672, 678, 680, 698, 703, 708, 714, 721, 723, 724, 728, 731, 740, 742, 750, 751, 756, 758, 769, 772, 775, 780, 787, 791, 799, 806, 808, 812, 823, 830, 831, 832, 842, 855, 858, 870, 873, 876, 883, 897, 901, 911, 917, 938, 942, 943, 954, 956, 957, 959, 960, 963, 964, 976, 978, 979, 991, 992, 995, 1001, 1005, 1009, 1011, 1013, 1024, 1039, 1040, 1046, 1054, 1055, 1061, 1073, 1074, 1075, 1076, 1081, 1085, 1102, 1139, 1148, 1154, 1155, 1156, 1157, 1159, 1160, 1162, 1164, 1167, 1169, 1173, 1174, 1185, 1195, 1200, 1204, 1210, 1211, 1221, 1222, 1225, 1226, 1227, 1228, 1232, 1234, 1235, 1237, 1238, 1240, 1245, 1248, 1251, 1252, 1259, 1260, 1267, 1268, 1270, 1271, 1276, 1282, 1287, 1288. 1292, 1294, 1295, 1300, 1303, 1304, 1325, 1327, 1333, 1343, 1353, 1354, 1355, 1368, 1371, 1376, 1402, 1403, 1404, 1407, 1410, 1417, 1418, 1425, 1440, 1444, 1448, 1451, 1453, 1454, 1455, 1456, 1482, 1498, 1505, 1506, 1507, 1508, 1515, 1517, 1519, 1522, 1523, 1527, 1535, 1537, 1542, 1554, 1555, 1558, 1560, 1563, 1564, 1568, 1569, 1571, 1572, 1579, 1582, 1590, 1597, 1593, 1594, 1615, 1623, 1630, 1631, 1632, 1634, 1635, 1644, 1646, 1648, 1652, 1656, 1659, 1660, 1661, 1662, 1663, 1665, 1667, 1681, 1682, 1684, 1687, 1688, 1696, 1697, 1707, 1709, 1710, 1713, 1719, 1720, 1721, 1723, 1724, 1728, 1730, 1732, 1733, 1745, 1749, 1765, 1766, 1767, 1773, 1775, 1788, 1789, 1791, 1803, 1815, 1817, 1830, 1831, 1839, 1840, 1841, 1843. 1844, 1845, 1847, 1852. 1860, 1867, 1868, 1869, 1872, 1882, 1903, 1906, 1911, 1913, 1914, 1915, 1916, 1919, 1926, 1938, 1942, 1943, 1950, 1951, 1959, 1965, 1968, 1970, 1987, 1991, 1996, 1997, 1998, 1999, 2000, 2001, 2016, 2021, 2024, 2026, 2027, 2028, 2029, 2033, 2035, 2036, 2040, 2041, 2059, 2060, 2061, 2065, 2072, 2074, 2075, 2079, 2083, 2084, 2086, 2089, 2093, 2094, 2096, 2098, 2099, 2106. 2110, 2111, 2116, 2133, 2135, 2136, 2138.

MISCELLANEOUS.

No. 49—28, 42, 711, 1626. *No.* 50—28, 42, 277, 463, 516, 711, 1626, 1629, 1818, 2020, 2131. *No.* 51—28, 131, 277, 463, 516, 553, 711, 859, 874, 932, 1626, 1629, 2017, 2020, 2073, 2082, 2131. *No.* 52—28, 131, 277, 286, 463. 516, 553, 859, 874, 932. 1178, 1626, 1629, 2017, 2020, 2073, 2119, 2131.

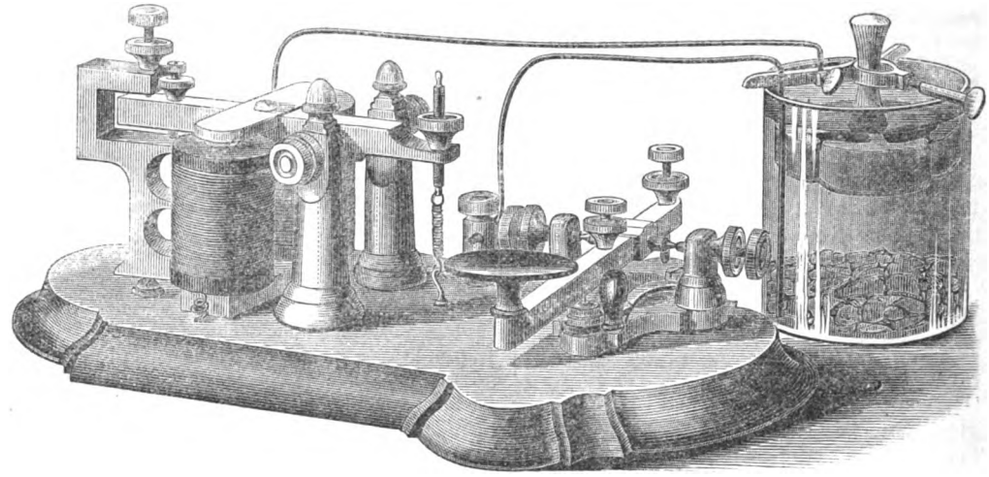
CATCH HIM!

CAIRO AND VINCENNES RAILROAD,
CAIRO, Ill., Nov. 15, 1873.

On Thursday, November 6, an operator, named Frank Finley, absconded from Vienna, on Cairo and Vincennes Railroad, with two hundred dollars of Company funds. The said Finley is a fair, sound operator, with general good appearance, and likely to deceive; has light hair, light-blue eyes, light, thin moustache and red, full cheeks; is about 5 feet 7 inches in height, and probably 23 years of age; had on, when last seen, dark-brown frock coat, dark vest and light pants, well worn. Any information, leading to his arrest, will be liberally paid for.

J. A. PATTERSON, *Supt. Tel. Co.*

IF a person eats between meals, the process of digestion of the food already in the stomach is arrested, until the last which has been eaten is brought into the condition of the former meal; just as, if water is boiling and ice is put in the whole ceases to boil until the ice has been melted and brought to the boiling point, and then the whole boils together. But it is a law of nature that all food begins to decay after exposure to heat and moisture for a certain time. If a meal is eaten, and in two hours another, the whole remains undigested for seven hours, before which time the rottening process commences, and the man has his stomach full of carrion—the very idea of which is horribly disgusting.



PARTRICK, BUNNELL & CO.'S

Champion Learners' Instruments.

COMBINED No. 1 SOUNDER AND KEY, with
BATTERY, OFFICE WIRE, CHEMICALS, and a thorough
BOOK of PRACTICAL INSTRUCTION in the Art of Telegraphy

Which latter gives all necessary directions for setting up the Battery and complete apparatus, and operating them for practising or communicating purposes.

THIS IS WARRANTED TO BE, BEYOND ALL COMPARISON, THE BEST APPARATUS EVER OFFERED FOR THE USE OF STUDENTS OF TELEGRAPHY.

Being excellent Morse instruments, substantially made and nicely finished, with nothing left out of their construction which pertains to a Complete Sounder and Key Combination Set. Nothing made in miniature, or in awkward and unusual shape, as is done with the very cheap affairs usually offered as Learners' Apparatus. They are equally well suited

For TELEGRAPHIC SCHOOLS OF INSTRUCTION, For PRIVATE TELEGRAPH LINES, and
For CITY WIRES OF TELEGRAPH COMPANIES.

The BATTERY which accompanies the Learners' Outfit is a full-sized Callaud, the same as the best cells used by Telegraph Companies for main battery, and gives sufficient power to produce a loud, clear sound from the instrument, the Sounder of which embodies the same remarkable principles of sound which have made our "Giant Sounders" so famous and popular among telegraphers.

The BOOK OF INSTRUCTION is a clear and practical explanation, by an experienced telegrapher, of every fact and principle of modern telegraphy and its apparatus which a student of the art could possibly require to obtain, in undertaking to become an accomplished sound operator.

PRICE OF APPARATUS complete, with Book of Instructions, Battery, Wire, and all necessary materials for one complete office outfit, ready for shipment, $10, sent by Express, C. O. D.; or $9.50, if money order for that amount be sent in advance. The latter plan will additionally save the purchaser the Express charges for returning money.

PARTRICK, BUNNELL & CO.,
38 South Fourth Street, Philadelphia.

The *London Telegraphic Journal* announces a professional Almanac, to be called *the Telegraphic Journal Almanac*, and which was to appear Nov. 15th.

The steamship Hooper has started with 1,500 miles of cable to be laid from Pernambuco, where it will be joined up with the section just laid to Bahia, and from Bahia to Rio de Janeiro. At the latter point the Hooper cable will be coupled up with the Plato Brazillian Company's line, which company will lay a cable from Rio to Maldonado. From the latter point the Montevidean Company will lay a cable to Montevideo, which will be united to the Buenos Ayres cable to Valparaiso.

MARRIED.

BURGOON—MOUSE.—Sept. 23, at Johnstown, Pa., by Rev. Gallagher, Frank J. Burgoon, manager W. U. Tel., Conemaugh, Pa., to Miss Maggie Mouse.

MCCARTY—CARPENTER.—November 11, 1873, at the residence of the bride's parents, in Bullitt County, Ky., W. O. B. McCarty, bookkeeper W. U. Telegraph Office, Louisville, Ky., to Miss Rhoda A. Carpenter, of Bullitt County, Ky.

BORN.

BUSKIRK.—To J. S. Buskirk, operator D. L. and W. R. R., Orange, N. J., November 2, a son.

DIED.

COX.—In Batesville, Panola Co., Miss., on Thursday, November 13, of typhoid fever, William A. Cox, manager W. U. Tel. Co.

SECOND-HAND RELAYS.

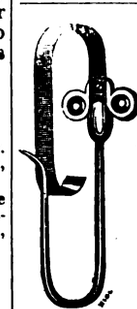
A large lot of well polished and good working Relays for sale cheap.

Also several sets of

HICKS' REPEATERS,

In perfect order, at a nominal price.

GEO. H. BLISS & CO.,
41 Third Avenue,
Chicago, Ill.



Security Message Hook.

PATENT APPLIED FOR.

The damage from the loss of a single message will equip a line many times with our new Hook, which gives great security.

Price 30 *cents each.*

Price per dozen $3.00.

LIBERAL TERMS TO THE TRADE.

GEO. H. BLISS & CO.,
41 THIRD AVENUE, CHICAGO, ILL.,
GENERAL AGENTS.

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THE SERVICE.

CALIFORNIA DIVISION.

SAN FRANCISCO, Nov. 14, 1873.—The following appointments, transfers and resignations have taken place in this Division since date of last report:

Appointments.—Thos. R. Sheridan, Albany, Or.; Miss Weidman, Petaluma, Cal.; C. H. Boynton, Sacramento, Cal.; C. W. Gearhart, Stockton, Cal.; Thos. McMicken, Dayton, Nev.; W. F. Cox, Cherry Creek, Nev.; J. K. Ellis, Gordon's Station, Cal.; T. F. Holland, Vallejo, Cal.; G. R. Stanton, Stockton, Cal.; A. Hebberling, Dayton, Nev.; L. L. Williams, St. Joseph, Or.; H. Scheld, Trinity Centre, Cal.; F. W. A. Crain, Eugene City, Or.

Tranfers.—W. T. Hunter, Bakersfield, Cal., to Visalia, Cal.; W. T. Hunter, Stockton, Cal., to Bakersfield, Cal.

Resignations.—G. W. Richards, Albany, Or.; G. R. Stanton, Reno, Nev.; C. H. Boynton, Reno, Nev.; C. D. Ellis, Stockton, Cal.; A. Hebberling, Dayton, Nev.; F. P. Lee, Virginia, Nev.; C. W. Johnston, Dayton, Nev.; J. W. Kelly, St. Joseph, Or.; J. E. Murray, Trinity Centre, Cal.; A. V. Peters, Eugene City, Or.

Yours truly,

JAMES GAMBLE, *Gen'l Sup't.*

ALFRED CORNU has recently made an experimental determination of the velocity of light. The rate of movement obtained is 189,200 miles per second in a vacuum. This agrees very closely with the result obtained by Foucault by a different method in calculating the parallax of the sun. This number gives the value 8″.86, which agrees with that obtained recently by M. Leverrier; it must, therefore, be accepted as being very near the true number.—*Scribner.*

RED STAR LINE.

ANTWERP SERVICE.

APPOINTED TO CARRY THE BELGIAN AND UNITED STATES MAILS.

		From Antwerp.	From Philad'a.
"VADERLAND," Captain Vander Heyden,	2800 tons.	Nov. 12.	Oct. 22.
"RYDAL HALL," Captain Collin,	2114 tons.	Oct. 11.	Nov. 5.
"NEDERLAND," Captain H. W. James,	3000 tons.	Oct. 25.	Nov. 22.
"SWITZERLAND," Captain ——,	3000 tons.	Building.	

PRICES OF PASSAGE:

Cabin.....$100 gold.
Steerage.....85 currency.

Prepaid Certificates, $36 currency.

LIVERPOOL SERVICE.

	Tons.	Master.	From Liverp'l.	From Philad'a.
"ABBOTSFORD,".....	2538.	Findlay.	Oct. 29.	Nov. 20.
"KENILWORTH,".....	2538.	Putt.	Nov. 12.	Oct. 23.

PRICES OF PASSAGE:

Cabin.....$100 gold.
Steerage.....80 currency.

Prepaid Certificates, $32 currency.

Tickets will be sold here at lowest rates, good from Antwerp and Liverpool to all interior points in the United States, *via* the Pennsylvania Railroad and its connections, thus affording parties in this country a convenient and cheap opportunity of sending for their friends in Europe.

THE RED STAR LINE will give special attention to the comfort of steerage passengers; comfortable berths, well-ventilated sleeping apartments and good food will be furnished them.

An experienced Surgeon is attached to each vessel.

Freight will be received at all principal points in the West and South, in connection with the Pennsylvania Railroad, Southern Mail Steamship Company and Clyde's lines, and through Bills of Lading issued for Antwerp, Bremen, Hamburg, Havre, Amsterdam, Rotterdam, Liverpool, London, Glasgow, Belfast, Hull and Leith.

The Red Star Line docks at Philadelphia are in direct connection with the Pennsylvania Railroad, and all merchandise intended for points beyond Philadelphia can be transferred from the hold of the steamer to the cars without the expense to shippers and risk of damage by re-handling, which results from cartage.

For rates of freight and passage, and other information, apply to

PETER WRIGHT & SONS,

GENERAL AGENTS, PHILADELPHIA.

William Hunter & Co., Agents, Liverpool. | B. Vander Becke, General European Agent, Antwerp.

WATTS & COMPANY,

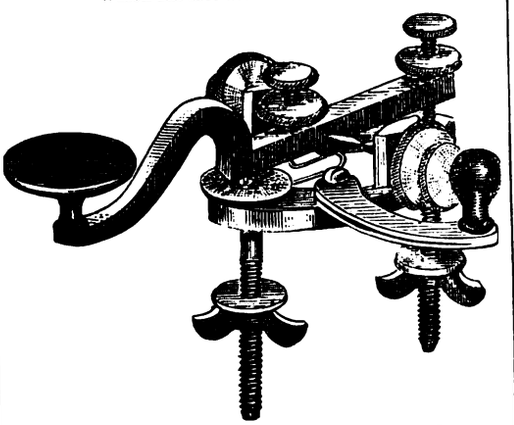
47 Holliday Street,

Baltimore, Md.,

SOLE MANUFACTURERS OF THE

PATENT CIRCUIT-CLOSER KEY,

Which has met with marked success.



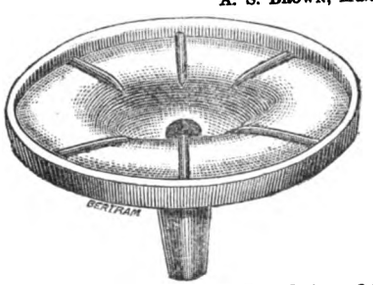
Price, $5 50 plain $7; nickel-plated.

The following is from a competent judge, written after some weeks' trial.

145 BROADWAY, NEW YORK,
Sept. 22d, 1873.

DEAR SIR,—Your circuit-closing attachment on the key, left with me for trial, is pronounced by all who have used it a decided and much-needed improvement on the common form.

Respectfully,
A. S. BROWN, *Manager.*



The Best Form of Battery Insulator Offered.

SIMPLE AND PERFECT.

Made of porcelain, handsome in appearance. Occupies little more space than the cell it supports. Each cell of battery completely isolated. Leakage is reduced to the minimum by the use of it.

General Superintendent Van Horn, Southern Division W. U. Tel. Co., writes of it:

"We have now in use a thousand or fifteen hundred of your battery insulators, and expect to order many more before the close of the year.

We have never used any battery insulator that equals it in any respect. In fact, it appears to be as near perfect as we can reasonably expect, in a contrivance for that purpose."

Price 40 cents

We offer a very excellent article of Galvanized Wire, superior to any in the market. The linemen on Baltimore and Ohio R. R. say they have never seen its equal for toughness and flexibility.

Special attention given to building.

Estimates given for any amount of material for telegraph construction or extension.

SWITCHES, GALVANOMETERS, RESISTANCE COILS, &c., to order.

Designs for Switch Boards for special service furnished.

SCOTT'S PATENT ANNUNCIATOR,

for Hotels and Residences.

PENSACOLA TELEGRAPH CO.

C. L. LE BARON, *President.*

CHARLES LE BARON, JR., *Sec'y and Treasurer.*

PENSACOLA, FLORIDA.

OFFICES IN

PENSACOLA, FLA. FERRY PASS, FLA.
MOLINO, FLA. MILTON, FLA.
PENSACOLA JUNCTION, FLA. BAGDAD, FLA.

Connect with the lines of the WESTERN UNION TELEGRAPH COMPANY at Pollard, Ala.

Governed by the same Rules and Regulations as the Western Union Telegraph Company.

WATTS & COMPANY,

47 Holliday Street,

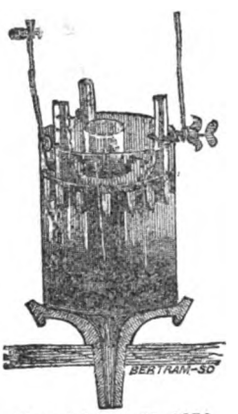
Baltimore, Md.,

MANUFACTURE

Telegraph and Electrical Instruments

OF EVERY DESCRIPTION.

Facilities for supplying any description of Machinery or Material equal to any in the United States.



Patented Dec. 31, 1872.

Over SIX THOUSAND cells of the Baltimore Battery in use by the Gold and Stock Telegraph Company of New York in their Private Line Department, is a sufficient acknowledgement of its merit, as a form of the gravity battery, combining the valuable principles of

Economy, Cleanliness and Constancy,

"—in fact a base-burner."

F. L. POPE
Telegrapher, July 5th, '73.

SELF-FEEDING,

No Sulphate of Copper can reach the Sulphate of Zinc Solution.

The shape of Zinc and Copper, which, with the tube, were patented December 31st, 1872, secures the largest surface with least weight of the metals. Half pound sulphate copper per month, ample supply for No. 2, or 3.

Following is one of the many letters we have from reliable telegraphers:

PIEDMONT, W. Va., September 28th, 1873.

Messrs. WATTS & Co.,
Baltimore, Md.

GENTLEMEN:—On January 1st, 1873, I put up 75 cells of your No. 2, Baltimore Battery, in place of 40 cells of carbon, from which two railroad wires of 100 miles each, are supplied. It has not since been taken down or cleaned, and has required no attention, except to fill the tubes with blue stone, once each month, and replenish the fluid once or twice during this period, made necessary by evaporation.

I am fully convinced, from long experience, that this is superior to any other form of the gravity battery.

It has now been in constant use for nine months, and will not need new zinc until after January next.

Respectfully,
J. G. NESBITT, *Manager.*

ORDERS FOR THIS BATTERY PROMPTLY FILLED.

A large stock constantly on hand.

No. 1 for Electro-motors, R. R. signals or similar service, $2.25
No. 2 ordinary local or Printing Telegraph main $1.75
No. 3 ordinary main $1.25

A very Superior Main Line Sounder.



Brass, $22.50. Nickel-plated, $25.00.

For wrecking purposes or temporary offices, this instrument is without a rival.

A perfect combination, handsome, good-sounding instrument.

NO LOCAL REQUIRED.

Well seasoned black walnut box, large enough for pencils, paper, plyers and office wire, in addition to the instrument, $4.

Larger size for climbers, vises, &c., $5.50.

RELAYS, SOUNDERS AND KEYS,

always on hand, plain or plated.

Our Challange Sounder is the noisest instrument made.

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Tillotson's Programme

FOR THE HOLIDAYS.

Attention, Telegraphers!!

☞ In order that we may be able to keep our men employed during the present hard times, we offer the following liberal inducements to purchasers of telegraph material until the

First of January, 1874.

To any person sending us an order for telegraph goods, however small, we will present a copy of Smith's Manual of Telegraphy, gratis.

For an order amounting to from five to ten dollars, we will present one year's subscription to the JOURNAL OF THE TELEGRAPH, or one copy Bond's Hand-book of Telegraph, (British).

For an order amounting to from twenty to thirty dollars, one year's subscription to the Telegrapher, a copy of Pope's Modern Practice of Electric Telegraph, or PRESCOTT'S HISTORY OF THE TELEGRAPH.

For an order amounting to from thirty to fifty dollars, one of either of the following instruments, viz: our Patent Excelsior Instruments for Students' use, our No. 1 or No. 2, Pony Sounder, or our No. 1 or No. 2 Key.

For an order amounting to one hundred dollars, our No. 1, or other style Relay of our manufacture.

For an order amounting to five hundred dollars, our Premium Spring Register.

For an order amounting to one thousand dollars, our Premium Spring Register with No. 1 Relay, Key, Lightning Arrester, and Cut Out, all nickle-plated and combined on marble base.

For an order amounting to ten thousand dollars, our magnificent Set of Sterling Silver Instruments, including Register, Relay and Key, and two Paper Rules, the whole worth $2,000.

Tillotson's Great Specialties.

Johnston's Celebrated Galvanized Line Wire, all sizes, sold at same prices as inferior wire of other manufacture.

The Kenosha Insulators, for which we are the sole Eastern Agents.

The Patent Canvel Screw Glass Insulator.

The New Patent Lockwood Battery.

The Famous Patent Leclanche Battery, for open circuits.

The well-known Patent Hill Battery.

The popular Callaud Battery.

The Patent Nitro-Chromic Battery, for heavy work.

The American Compound Patent Line Wire.

The Bishop Cables, Gutta Percha, Office and Magnet Wires, etc.

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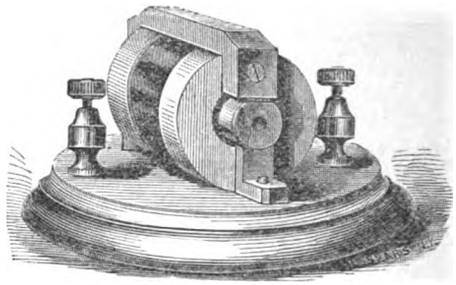
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JOURNAL OF THE TELEGRAPH.

VOL. VI. NO. 26. NEW YORK, DECEMBER 15 1873. WHOLE NO. 147.

MILLIKEN'S REPEATER.

Numerous devices have been from time to time invented and employed for operating, automatically, telegraphic repeaters, combining two or more Morse circuits for the purpose of direct transmission, greater distances than practicable without such combination. That is to say, devices to automatically prevent the breaking of the sending circuit at any point, other than at the key of the sending operator.

In the old "switch repeater" the contact points which would otherwise break the sending circuit, are cut across by the use of a hand switch provided for the purpose, but the necessity of reversing its position whenever a break occurs, or the direction of transmission is to be reversed, renders this method extremely troublesome and uncertain, especially when transmitting through two or more repeaters.

In any arrangement for doing this, or an equivalent service automatically, some device for the purpose must be applied in each instance of opening the circuit and removed upon again closing the same. By this means, the action of the repeater may be reversed at pleasure, for the reason that, whichever of the two closed circuits assumes the initiative by opening, operates the repeater in such a manner as to prevent itself being opened at that point also; while at the same time, or substantially so, a break is transmitted to the next circuit in combination.

Various devices may be successfully applied to accomplish this, provided the lines be so nearly free from escape as to allow the armatures of the relay magnets on each side of the repeater, to work in unison; but it becomes a more difficult matter in working very long circuits, or over escapes necessitating high relative tension of the relay springs.

The chief difficulty, then, encountered by automatic repeaters in general, is that of so arranging as to continue this device in operation for such length of time after the closing of the circuit by the sending operator, as will enable the relay itself to control and close its armature by attraction, thus providing against a false break upon its removal.

In consideration of the conditions under which repeaters are really valuable, this feature is of vital importance.

No false breaks can occur from such cause in the use of the Farmer and Woodman repeater, patented in the year 1857, and from this fact the invention seemed for a time likely to prove a grand success and a final solution of the repeater problem; but experience demonstrated that the means by which the desired object was attained, introduced another feature, rendering the repeater exceedingly difficult to operate and which was fatal to its general adoption.

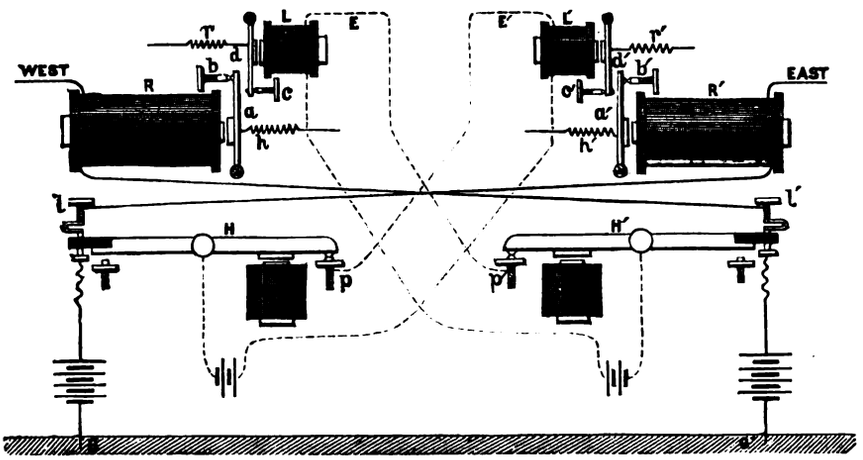


Figure 1.

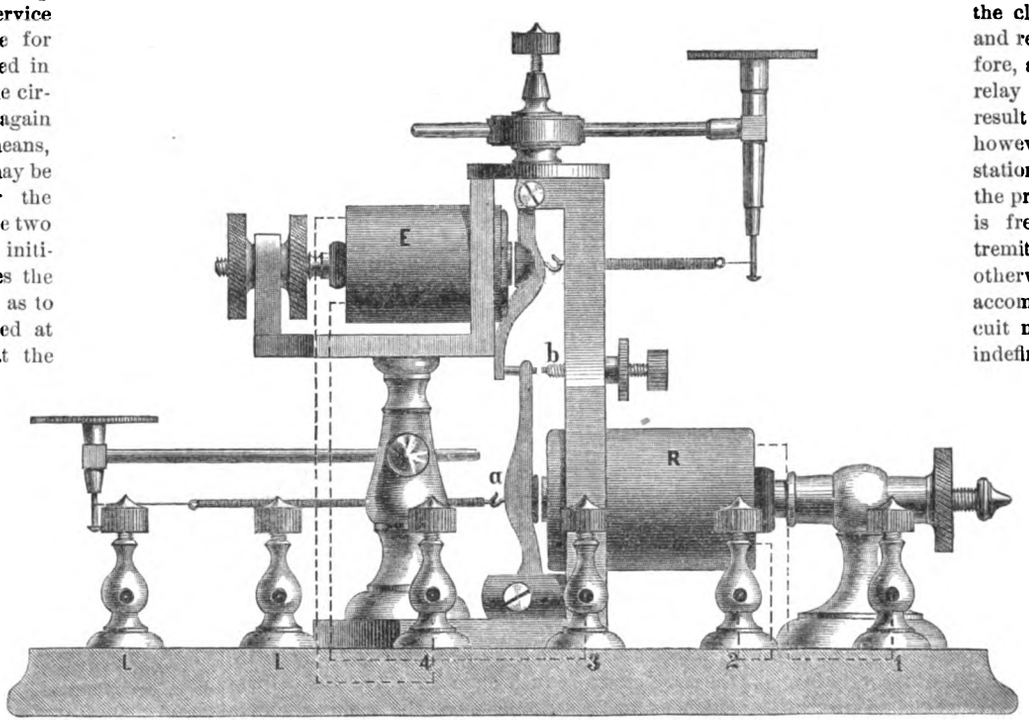


Figure 2 (A) (B).

The device employed by Messrs. Farmer & Woodman, is mechanical in its operation and consists of a light metallic hook, having an arm and so situated that the armature lever of the sounder on the sending side of the repeater, in its upward movement and before breaking the main receiving circuit, strikes this arm, and pushes the hook under the extremity of the opposite sounder armature lever, which is thus prevented from moving a distance sufficient to open the sending circuit at that point; a full play of the armature levers being necessary in order to break the main circuits, by lifting contact springs. This hook and arm would be returned to their original positions by the operation of a spring provided for the purpose, except for the *pressure of the armature lever upon the hook*, causing the detention of the latter until the relay magnet of the receiving circuit becomes sufficiently charged to draw its armature forward, followed, of course, by the closing of the local circuit and release of the hook. Therefore, any desirable tension of the relay spring cannot change the result in this respect. In breaking however, the distant receiving station must open the circuit at the precise instant when the hook is free (or not under the extremity of the sounder lever), otherwise this object cannot be accomplished, although the circuit may be held open for an indefinite time.

Inasmuch as the proportion of time during which the sounder lever and hook are locked, depends upon the relative tension of the relay spring on the receiving side, it follows that oftentimes great skill must be exercised by the distant receiving operator, in order to throw in a break at the right moment.

The custom was, in the use of this repeater, to make a succession of dots, until one of the intervening breaks chanced to make a hit; but the loss of time and uncertainty in this respect, caused the abandonment of the system.

In the Milliken repeater, the defect to which we have referred, as generally found in automatic repeaters, is entirely obviated, without the introduction of any feature detrimental to its operation in other

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respects (as in the case of the Farmer and Woodman invention) by the employment, in connection with each of the repeater relays, of an extra local magnet, the armature lever of which, when drawn back by its spring against the lever of the relay with which it is placed in mechanical combination, prevents the movement of the latter, when the main circuit through the relay is broken. The adjustment of these extra local magnets and of their armature springs, being entirely independent from that of the relays, it is simply necessary that such springs be *actually and relatively* stronger than those of the relays with which they are mechanically combined.

By this means, false breaks arising from any required tension of the relay spring on the receiving side of the repeater, are effectually prevented; as will be seen by the following description of its construction and operation, reference being had to the accompanying diagrams.

Figure 1 represents the apparatus employed and shows the connections between its parts, with the exception of those of the ordinary local circuits, to which reference is not here necessary, the relay on each side operating its sounder in the usual manner. The course of the extra local circuits are shown by dotted lines. The extra local magnet on each side, is placed in a position opposite to the relay and at a convenient height, so that its armature lever, when drawn back, may press against that of the relay, as shown in the diagram.

R and *R'* represent the relay or receiving magnets, placed in the main circuits, which connect the batteries and earth *G'* and *G* through the repeating points *l'* and *l* of the opposite sounders respectively.

LM and *LM'* are the local sounder magnets, each operated by the relay on the same side.

L and *L'* are extra local magnets operated respectively by the movement of the opposite sounder levers *H'* and *H*, as indicated by the dotted lines *E* and *E'*.

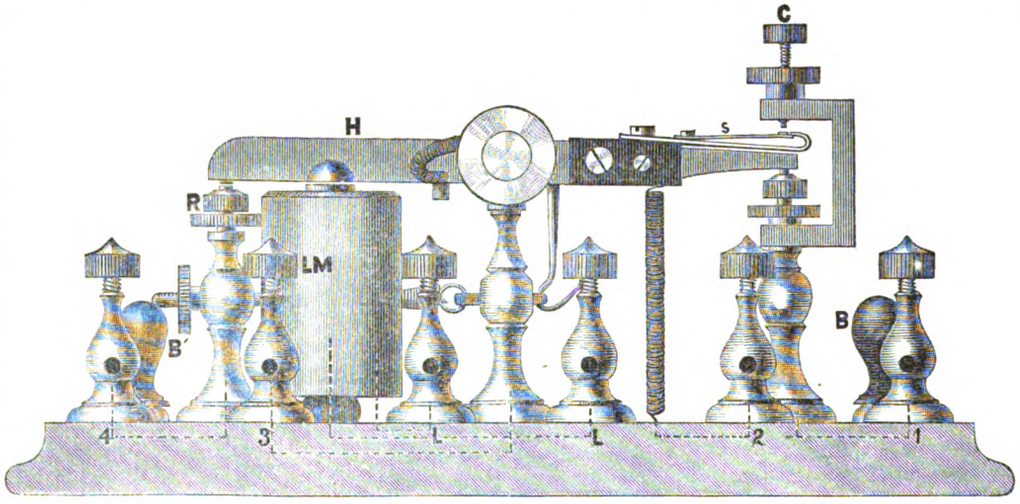


Figure 3 (A) (B).

Now, if the western main circuit be broken at a distant station, the movement of the armature lever *a* of the relay *R*, breaks the local circuit of the sounder *LM* at *b*, causing the sounder lever *H*, to break the extra local circuit *E'* at *p*, thus allowing the armature lever *d'* to be drawn by the spring *r'* against the extremity of the relay armature *a'*. The same movement of the sounder lever *H* also breaks, at substantially the same time, the eastern main circuit at *l*, but the lever *a'* is prevented from being drawn back, and thereby causing a break in the western main circuit *l*, by the tension of the spring *r'*, which is so adjusted as to effect the release of the armature *d'*, from the attraction of the magnet *L'* before the armature *a'* is released from that of the relay magnet *R'*, the spring *r'* being also of sufficient strength to hold the armatures against the stop *b'* in opposition to spring *h'*.

If now the western circuit be again closed, the return of the armature lever *a* by the attraction of the relay magnet *R* closes the local circuit on that side of the repeater, followed by the closing of the eastern main circuit at *l*, and also of the extra local circuit *E'* at *p*. The relay armature lever *a'* being again attracted by the relay magnet *R'*, upon the closing of the eastern circuit, no longer requires to be mechanically held against the stop *b'* by the armature lever *d'* and it is therefore drawn against the stop *c'* by attraction of the extra local magnet *L'* consequent upon the closing of its circuit *E'*, but in thus returning the repeater to its normal position, it must be understood that in case the spring *h'* is of high relative tension, such tension being necessary in order that a break may be received at the relay *R'* from the distant eastern station, a corresponding increased relative tension must be given to the spring *r'*, otherwise the extra local magnet *L'* will become sufficiently charged to overcome the spring *r'* and so draw away the armature lever *d'* before the relay magnet *R'* becomes charged to the extent necessary in order to hold its armature *a'* in place, in which case it will be momentarily released and a false break ensue from a reverse action of the repeater. This forward movement of armature lever *d'* may, however, be retarded to any degree necessary, by a proper tension of the spring *r'*, even though it be held almost constantly against the armature lever *a'* and yet a break from the distant eastern station be promptly effective, provided the relay *R'* be properly adjusted to receive it. For instance, the distant receiving station breaks. We will suppose the western circuit to have been open at that instant, at the key of the sending operator. Instantly upon closing it, the relay *R* closes it local circuit, followed by the closing of the extra local circuit *E'* at *p*. The eastern main circuit, however, being open at the distant office, the armature lever *a'* will be drawn back instantly upon the first forward movement of armature *d'*. Thus the action of the repeater may be reversed, it being understood, of course, that its opposite parts may be operated in precisely the same manner.

It should be remembered, that in closing the main circuits at *l* and *l'* by movement of armature levers *H* and *H'* springs are used for the purpose on account of the additional contacts necessary to be made by the same levers, at their opposite extremities. Inasmuch as by this arrangement the main circuit is closed before that of the extra local, and remains closed an instant longer, it may be regarded as favorable to the action of the repeater, although not essential, its successful operation being entirely due to the principle applied, which is, that *the ratio of the resistance of the extra local armature spring to the attractive force of its magnet, is greater than the ratio of the resistance of the relay armature spring to the attractive force of the relay magnet*, the combination being as shown in the diagram.

It is, therefore, not necessary to allow full play to the sounder levers, for the purpose of gaining time between the closing of the main and extra local circuits. On the contrary they should have the *least possible movement*, with due regard to securing perfect connections at the spring contact points, and to convenience in reading.

Figures 2 (*A*) (*B*), and 3 (*A*) (*B*) will illustrate the connections from helices, contact points and switches, to binding screws arranged upon the base boards, the relay and its sounder of one side of the repeater being designated in the description by the letter (*A*), and those of the other side by the letter (*B*), by which plan the connections of the full repeater may be represented in drawings of one side only.

L and *L*, in figure 2, are binding screws connecting respectively with the stop *b*, and armature lever *a*, forming the contact points of the ordinary local circuit.

L and *L* figure 3, are also local circuit binding screws, connecting with the sounder coils *L M*, these four binding screws being connected together, on the *A* side of the apparatus, with a local battery in the same manner as those of an ordinary relay and sounder.

Duplicate connections are made at and between the other relay and sounder, consequently the relay of figure 2 (*A*), operates the sounder of figure 3 (*A*), and the relay of figure 2 (*B*), that of figure 3 (*B*).

Binding screws 1 and 2, figure 2 (*A*), are the terminals of relay coils *R*, and connect by wire, one with the key, thence to line and the other with the binding screw 1, figure 3 (*B*); thence through the post and contact points formed by the adjustable screw *c* and spring *s*, (the latter being insulated from the sounder lever *H*); thence by the spiral connecting wire, to the binding screw 2, at which point the circuit is completed by connection with battery and earth.

Binding screws 3 and 4, figure 2 (*A*), are the terminals of extra local coils *E*, and connect, one with a battery of one Grove cell, or its equivalent, and the other by a connecting wire, with binding screw 4, figure 3 (*B*); thence through the post and contact points formed by the adjustable screw *R*, and sounder lever *H*; thence by the middle post to binding screw 3, which, being connected to the other pole of the Grove cell, completes the extra local circuit.

The main and extra local circuit connections between the binding screws of figure 2 (*B*), and those of figure 3 (*A*), are made in a similar manner as those described, referring to the same numbers; the internal connections being, of course, the same.

The switches *B* and *B'*, figure 3, are used only for the purpose of connecting across the contact points of the main and extra local circuits, when desirable to use each side of the repeater, as an ordinary relay and sounder. One point of switch *B* therefore connects with binding screw 1, and the other with binding screw 2.

One point of switch *B'* connects with binding screw 3, and the other with 4, this arrangement being the same on each side.

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MATHEMATICS FOR NON-MATHEMATICIANS.

By W. PAGET HIGGS, LL.D., D.Sc.

Division I.—The Algebra of Constant Quantities.

Dicision, Fractions and Ratio.

The reader may ask why the common order of mathematical books is departed from, by bringing to one focus the consideration of the principles of so apparently diverse subjects as division, fractions and ratio. Perhaps the most efficient answer will be found in a general statement of the symbols employed in the algebraic representation of these processes.

I. The operation of *dicision* is, algebraically, represented in two ways :—

a. The quantity to be divided (the *dividend*) is written before the sign ÷ (to be read "divided by"), and this sign precedes the dividing quantity (the *divisor*). Thus $a \div b$ is to be understood to indicate the division of a by b.

b. The dividend is written above a short line, the divisor below the line, thus $\frac{a}{b}$.

In both cases the result of division is termed the *quotient*. And the entire operation and result may be stated in the form of an equation, either as—

(*a*). $a \div b = q$; or as—

(*b*). $\frac{a}{b} = q.$

II. The last expression, $\frac{a}{b}$, is the general form by which is represented a *fraction ;* illustrated by supposing a to represent an apple, and b the number of parts into which it is to be divided. If we divide one apple in two parts we have, numerically: $\frac{1}{2}$ or one-half as the result. And generally if we divide n things into p portions, or among p persons, each portion will be, or each person will get, that quantity of the things represented by $\frac{n}{p}$.

III. There are two methods of representing the relation or *ratio* of two quantities :—

(*a.*) The most useful is the form of a fraction, as $\frac{n}{p}$; here the ratio expressed is that of the number of things to the number of persons.

(*b*). The other method of representing the ratio two quantities bear to each other is by placing between them a colon (:),—thus $n : p$ has the same meaning as $\frac{n}{p}$, both expressions indicating the relation of the quantities.

Proportion is the equality of ratios. It is a common error to say that "two numbers bear a certain *proportion ;*" correct mathematical language would dictate that "two numbers bear a certain *ratio.*" Only *two ratios* can be said to be *proportionate.* Thus, if we have to divide a apples amongst b boys, or algebraically $\frac{a}{b}$; and if we have to divide n things amongst p persons, or algebraically $\frac{n}{p}$; then if the two ratios $\frac{a}{b}$ (ratio of the number of apples to the number of boys) and $\frac{n}{p}$ (ratio of number of things to number of persons) be equal, we may place between them the sign of equality (=) and the equation expresses a proportion—

$$\frac{a}{b} = \frac{n}{p}$$

or—

$$a : b = n : p ;$$

or, again, substituting the sign :: for the sign of equality—

$$a : b :: n : p.$$

This we see is a return to an earlier arithmetical stage of a rule of three sum. For suppose 6 apples amongst 3 boys, and 4 things amongst 2 persons, we have—

$$6 : 3 :: 4 : 2.$$

The relation, therefore, of division, fractions and ratio is sufficiently close to call for their undivided consideration. The expression—

$$\frac{a}{b}$$

may, we have seen, mean—

I. The number of times a contains b.

II. A fraction, a being the *numerator* and b the *denominator.*

III. The relation or ratio of a and b.

These three heads really express, under different forms, the same notion—the relation of a to b. In each case we may determine the value of the relation by a process of continued subtraction (as in multiplication we arrived at the product by a process of continued addition). Suppose, as a first example, that a represents 10, and the numerical value of b is 2 ; we shall find the value of the relation of a to b or $\frac{a}{b}$ to be 5 ; for we can subtract 2 from 10 5 times.

10	
2	1st subtraction.
8	
2	2nd "
6	
2	3rd "
4	
2	4th "
2	
2	5th "
0	

Suppose, as a second instance, that a should represent 2, and $b = 10$; then we should know that we have to divide 2 in 10 parts or 1 into five parts, taking one of those parts, or $\frac{1}{5}$th.

Let us now study the effect of different algebraic arrangements of the general expression—

$$\frac{a}{b} = q, \text{ or } \frac{10}{2} = 5.$$

In words, this tells us that the result of dividing the dividend (a) by the divisor (b) is the quotient (q). Again—

$$a = q\,b, \text{ or } 10 = 5 \times 2,$$

or the dividend equals the quotient multiplied by the divisor. And—

$$b = \frac{a}{q}, \text{ or } 2 = \frac{10}{5},$$

or, the divisor equals the dividend divided by the quotient.

Besides these equations, there are others expressing fundamental principles; and the chief of these is—

$$\frac{na}{nb} = \frac{a}{b},$$

or the multiplication of the numerator and denominator of a fraction, or the multiplication of the dividend and divisor, by an equal quantity, does not affect the value of the fraction nor of the quotient. Whence it may be perceived—

That the multiplication of the numerator of a fraction by an integer increases the value of the fraction.

That the multiplication of a dividend by an integral quantity increases the value of the quotient.

That conversely the multiplication of a denominator by an integral quantity decreases the value of a fraction.

That the multiplication of a divisor by an integral quantity decreases the value of the quotient.

If we substitute for the term "integral quantity" or "integer" (Anglicé, *whole* number) a fractional quantity, of course the converse only of each rule will hold good.

Rules for Division.

If we observe the rule (the same as for multiplication) that *division of* LIKE *signs yields a* POSITIVE *quotient, of* UNLIKE *signs a* NEGATIVE *quotient*, we may reduce the numerous rules for division given in many of our text-books to the following :

(1). To divide one *monomial* by another,—suppress the letters that are common to both ; subtract the exponents which affect the same letters ; and divide the co-efficients one by another.

(2). To divide a *polynomial* by a *monomial*,—divide each term of the polynomial by a monomial according to the first rule; connect the results by their proper signs (remembering like produce positive, unlike produce negative, signs).

(3). To divide *two polynomials* one by the other,—arrange them with respect to the same letter ; then divide the first terms one by the other, and thence will result one term of the quotient; multiply the divisor by this, and subtract the product from the dividend: proceed to the end in the same manner.

(4). To divide algebraic fractions,—invert the terms of the divisor, and multiply together the numerators and the denominators.

Examples to these Rules.

(1). $$\frac{12a^3b^2c}{3ab} = \frac{12}{3}a^{3-1}b^{2-1}c = 4a^2bc.$$

(2). $$\frac{6a^2 + 12ab - 9abc}{3a} = \frac{6a^2}{3a} + \frac{12ab}{3a} - \frac{9abc}{3a} = 2a + 4b - 3bc.$$

(3). $$\frac{a^3 - 3a^2b + 3ab^2 - b^3}{a - b}$$

Divisor.	Dividend.	Quotient.
$a - b$	$a^3 - 3a^2b + 3ab^2 - b^3$	$(a^2 - 2ab + b^2$
	$a^3 - a^2b$	
	$-2a^2b + 3ab^2$	
	$-2a^2b + 2ab^2$	
	$ab^2 - b^3$	
	$ab^2 - b^3$	

This year the value of gutta percha imported into Great Britain was £315,454; last year, in nine months, £296,331.

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ELECTRICITY AND THE SPECTRUM ANALYSIS.

Among many practical applications of spectrum analysis, one of the most important is in the manufacture of steel by the Bessemer process. A blast of air is forced through the melted iron to deprive it of a certain proportion of carbon. If this blast is continued a few minutes too long, or stopped a few minutes too soon, the whole operation is vitiated. By examining the flame of the converter with the spectroscope, the proper time to stop the blast is clearly indicated by the disappearance of the carbon lines and the change to a continuous spectrum.

But the uses of the spectroscope do not stop here. Scientific men have of late been turning their attention in a new direction, that of quantitative analysis by means of the spectrum. Not content with discovering what substances are contained in a given compound, they are devising means to determine the quantity of these substances.

The most recent and perhaps the most important method yet discovered is due to Lockyer of England. It is based upon the following principles: When an alloy is introduced into the electric arch, the most volatile metal will be carried across to the other pole first, and its vapor will form so good a conductor that but little of the less volatile metal will get into the arch. To make the principle perfectly plain, we will quote an explanation given by Tyndall. When showing his audience the characteristic lines of silver and thallium, he found that the latter were far brighter, and that the former were diminished, when a bit of thallium was put in with the silver in the electric arch. "It is the resistance," he went on to say, "offered to the passage of the electric current from carbon to carbon that calls forth the power of the current to produce heat. If the resistance were materially lessened, the heat would be materially lessened; and if all resistance were abolished, there would be no heat at all. Now thallium is a much more fusible and vaporizable metal than silver; and its vapor facilitates the passage of the current to such a degree as to render it almost incompetent to vaporize silver." The more, therefore, of the more volatile metal is present in an alloy, the less of the other can be vaporized by the arch.

Now on examining the arch by means of the spectroscope, Lockyer found lines extending across the whole width of the spectrum and shorter ones reaching only part of the way. The former corresponded to the more volatile, and the latter to the less volatile, metal. Now, as the length of the latter increases with the quantity of the metal present, it is evident that by measuring them we can ascertain that quantity. In these determinations, the electric current is obtained either from a powerful battery, a Ruhmkorff coil or a magneto-electric machine; and the heat of the spark is intensified and at the same time rendered constant by means of Leyden jars of constant surface. Instead of placing the alloy to be tested in one of the carbon electrodes, we might have the electrodes themselves composed of the metals. Suppose we make one of pure gold and the other of some alloy whose percentage of gold we wish to ascertain. Then by separating the electrodes sufficiently, we finally arrive at a point where the gold lines from the alloy no longer meet the lines from the pure gold, but will extend only part of the way, leaving a gap on their half of the spectrum. If we now keep the same distance between the electrodes, and experiment on alloys containing different percentages of gold, the length of their gold lines will be found to vary with that percentage. The length of the lines can easily be measured by causing the reflection of a graduated scale to fall upon the spectrum. In assaying, where we frequently have to do with samples of gold whose fineness differs but little, a series of electrodes of known composition may be prepared; and by comparing them with alloys of unknown fineness, it is easy to tell, by simple inspection of the spectrum, which is the finer. The lines of the one containing less gold will not extend all the way across.

HOW TELEGRAPHING IS DONE IN BRITAIN.

When Mr. Bright addresses his Birmingham constituents, his utterances are not for Birmingham alone, but for the whole country. His long-enforced absence from public duties, and his return to office as a Cabinet Minister, in the present unsettled state of politics, give to his present address far greater importance than has attached to any of his previous speeches. Every daily paper of any importance in every large town throughout England, Ireland and Scotland, had arranged to supply its readers with a verbatim report of Mr. Bright's speech. The *Times* sent its own reporter, and the Manchester and Leeds papers, with the *Glasgow Herald*, sent a combined staff to work in concert. As a matter of course, every word of the speech had to be telegraphed, and to meet the enormous pressure caused by having to transmit five or six independent reports, and to despatch these reports promptly throughout the length and breadth of the land, very complete and very elaborate special provision had been made at the Central Telegraph offices in Cannon street. For heavy work like this, the ordinary Morse instrument would not be nearly rapid enough, and so the mechanical power was augmented by 12 of Wheatstone's automatic instruments, the most expeditious and most perfect telegraphic instrument yet designed—indeed, so complete, that it seems almost that perfection has been attained. The action of the Wheatstone may be briefly explained. The manuscript to be transmitted is placed before a clerk, who presides at the perforating machine. Working as rapidly as the eye can follow, this dexterous operator reproduces the message in telegraph phonography, which is merely a series of dots and spaces upon an endless coil of tape paper, which is paid out from the box before him. As the tape leaves his hands, it exactly resembles the needlework which ladies call "insertion." A skilled operator can "punch" about 2,000 words an hour, equal to a column of ordinary newspaper type. Three dozen perforating instruments were brought down for last night's work, of which six were capable of producing three copies of the same message at one operation. The advantage of this is obvious, as three circuits may be kept going at the same time. The present was the first occasion that these triple perforating machines have been used out of London. From the perforator the prepared tape is taken to the Wheatstone instruments, the end is inserted, a handle is turned, something like the winding up of a musical-box, and the tape slowly passes beneath the "clicking" apparatus, by which the telegraph symbols are reproduced and written down by the receiving machine at the other end, be it London, Liverpool, Manchester, or to whatever town the communication is made. The extended report was last night transmitted by the twelve Wheatstone instruments, which were put in connection with the following circuits: Two to London, two to Liverpool, one to Sheffield, Leeds, Bradford and Hull; one to Bristol, Exeter and Plymouth; one to Darlington, Newcastle, Edinburgh and Dundee; one to Liverpool and Glasgow, one to Glasgow (special), one to Newcastle and Edinburgh; one to Manchester and Leeds (special); and one to Dublin and Belfast. To all these towns the message was sent direct—that is, it was not taken off for retransmission, making a sort of halfway halt, as is the ordinary custom with long-distance telegrams. The only towns that were not in direct communication with Birmingham, and to which the speech was sent either in full or in an abridged form, were Aberdeen, Inverness, Cork, Brighton, Norwich and Ipswich. Altogether, sixty clerks were engaged in the transmission of the reports of last night's meeting. The number of words transmitted was over 120,000, or equal to about sixty columns of newspaper type.—*Birmingham Post.*

NOTE.—We give the above excellent performance due publicity and credit. The time occupied is not given Sixty persons were employed in the sending office and 48 machines. We have only to say that 12 fair American operators with simple Morse keys beneath their fingers could have performed the same work in five and easily in six hours.

The Scientific American publishes an illustration of a postal telegraph carriage, now in use in Great Britain, for opening temporary communications. The idea is to have a movable office, carrying its own cable, apparatus and batteries, which can be transported from place to place, either by road or rail, at the shortest notice, and which can be taken to the wires when the wires cannot be taken to it. This, which is the only carriage of the kind in use for similar purposes, is constructed to carry one of each of the different forms of instrument (six in all) in use in the postal system, and can comfortably accommodate as many as eight clerks in full work. It carries, also, nearly 150 battery cells, and so skillfully is the accommodation designed that these are all stowed away out of sight in odd corners, so that not a single atom of space is lost. Half a mile of three-wire iron-sheathed cable is stowed away as snugly as possible in the "boot," and can be paid out and drawn in with the greatest ease in the world. The telegraph carriage has been used at agricultural shows and races, and similar occurrences, which sometimes take place away from cities.

LUDLOWVILLE, N. Y., Nov. 7, 1873.—In an article in the JOURNAL for Nov. 1st, entitled "Non-resistance of the Earth as a Conductor," is the statement: "The same battery will work to a far greater distance with a circuit half wire and half earth, than when altogether wire." Now, in a short line, of perhaps a quarter of a mile, three cups of Daniell's battery failed to work the circuit (including two ordinary pony sounders), when it was half earth, but worked with the return wire. A similar case was noticed in your columns, followed with your advice to deepen the ground connections and enlarge the plate. This was noticed and followed by us, but with no successful result. Now, what is the trouble? We have a good line, good insulation, good battery, and return wire. The line works O. K. We make earth connections, increase the battery (ground wires in constantly moist earth), and can't get a tick! We have tried everything suggested by theory and experience; still no current. What's the trouble? Please explain, and oblige

J. J. MITCHELL, *Manager.*

Answer.—There are conditions to every statement. The one given had reference to a long circuit. Your battery was small. There may have been obstructions on the face of your ground plate. The strata of soil may have been peculiar. On a short circuit the general statement may prove incorrect. Suppose you double your battery and compare results again.

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GREETING TO ARIZONA—THE TELEGRAPH THROUGH TO PRESCOTT.

On Thursday, August 28th, at nine o'clock A. M., work was commenced at San Diego on the San Diego and Arizona Military Telegraph. Yesterday, (November 18th) at one o'clock P. M., the line was completed through to Prescott, Arizona Territory. In one hundred and sixty-seven working days the "boys in blue" have built four hundred and seventeen miles of telegraph. When we consider the fact that the greater part of this line has been constructed through a wild and rugged country, sparcely inhabited, where the settlements are indeed "few and far between" and the facilities for the distribution of material are exceedingly limited, it may be justly claimed that this early consummation of the connection between Prescott and San Diego is wholly unprecedented in the history of telegraph construction. The announcement of the completion of the main line was a thorough surprise, the work having been closed fully a month earlier than the date fixed at the beginning of the operations at San Diego. It is an achievement of which all concerned may well feel proud.

HISTORY OF THE PROJECT.

The history of the project which has just been consummated may be briefly summarized. The necessity of the line was first strongly urged by General Crook and the military officers in the Department of Arizona and was pressed by Gen. Schofield, Gen. Sherman and Secretary of War Belknap. Delegate McCormick, with accustomed zeal and energy took the matter in hand in Congress and ably advocated the appropriation for the prosecution of the work on the floor of the House. On the 21st of February last, the sundry civil appropriation bill being before the House, the following paragraph, as amended by Delegate McCormick, was read:

"For the construction of a military telegraph from San Diego, California, via Fort Yuma and Maricopa Wells, to Prescott and Tucson, Arizona, $50,311,-80."

In a forcible speech in support of this appropriation, Mr. McCormick said.:

* * * "The enterprise properly belongs to the Government, and is in the direct interest of economy and efficiency. I undertake to say that instant communication between the officers of the army in Arizona and headquarters at San Francisco and in Washington would have prevented many of the differences between the citizens and the officers, many of the unsuccessful movements of the troops, a frequent waste of money, and much of the misrepresentation regarding military, civil and Indian affairs in Arizona which has puzzled the Eastern press and confused Congress, the Departments, and the public for some years past. * * * * * * * * * *

Upon every account in the Department of Arizona, where the Government is spending in military operations alone several millions per year, where there are no railroads, where is the largest number of absolutely hostile Indians, and where there must inevitably be active campaigning for some time to come, and after it extensive dealings with the Indians, all the facilities of the telegraph should be promptly provided; and this, in my judgment, and that of all interested, can in no way be so cheaply done as by the appropriation now asked and recommended by the committee."

The appropriation was thereupon agreed to and became a law.

THE WORK OF CONSTRUCTION.

The construction of the line was entrusted to the military authorities, and General Schofield, commanding the Division of the Pacific, at once ordered estimates to be made with a view to the commencement of the work. The direction of operations was confided to General George Cook, commanding the Department of Arizona. Mr. R. R. Haines, District Superintendent of the Western Union Telegraph Company, who has had great experience in telegraph building, was engaged by the military authorities to superintend the construction of the line. The wire, insulators, battery material and instruments were supplied by the Electrical Construction and Maintenance Company, of San Francisco.

The General Superintendence of construction and location of route was under R. R. Haines, of the Western Union Telegraph Company, assisted by Capt. Geo. F. Price, of the Fifth Cavalry. Foremen of Construction, D. McKillop, Geo H. Wilson and A. W. Ladd; Electricians, R. H. Howe, Thos. E. Atkinson and W. B. Ellison; Commanders of troops, Capt. Wm. E. Dove, Capt. Geo. F. Price and Lieut. Jno. F. Trout.

CHINESE TELEGRAPHS.

M. Viguier, of Shanghai, has imagined, says *Galignani*, a very simple system for the transmission, by telegraph, of Chinese messages, and the plan is at this moment adopted at Shanghai and Hong-Kong by the Great Northern Telegraph Company. The Chinese writing cannot be reproduced by the ordinary telegraph apparatus; consequently, to permit the Celestials to send telegrams in their own language, M. Viguier has devised the following expedient: Of the 41,000 characters which compose Chinese writing, 7,000 only are employed ordinarily, and are indispensable for every-day requirements. It being established that every educated Chinese ought to know at a glance to which of the 214 radicals each character relates, M. Viguier has ranged in columns these 7,000 characters under their respective radicals, and affixed to each a number from one to 1,000. Thus disposed, the characters are printed on seven large sheets, which the Chinese have to procure, and by means of which they can, in a very short time, find the signs they want. They write figures instead of letters, and in using certain conventional signs for the address and signature, the message may be transmitted as easily as any other. The receiving-office is provided with a table bearing the same series of numbers from one to 1,000, and the corresponding characters. There is no doubt that the application of M. Viguier's system will give a great impulse to the use of the telegraph among the Chinese, and contribute powerfully to spread that mode of correspondence over the whole Empire.

ON THE SOURCE OF ATMOSPHERIC ELECTRICITY.

In a recent number of the Journal of the Austrian Meteorological Society, Mühry has contributed somewhat to a better understanding of the obscure subject of atmospheric electricity, by considering it in reference to its geographical distribution. He maintains that the distribution over the earth's surface of the quantity of electricity is in general parallel with the distribution of temperature; it increases and diminishes with the latter, as well in reference to the earth's surface as in reference to the time of the year and the day. The insolation of the earth is to be considered as the source of the atmospheric electricity: its origin lies in the insulating stratum, and it is in this respect to be considered as terrestrial and not celestial. Atmospheric electricity diminishes as we go from the equator to either pole, and it therefore does not depend on precipitation of vapor, but on temperature. Terrestrial magnetism increases in force as we approach the poles. Electricity is strongest in dry, hot deserts. Contrary to the theories of Dellmann and of Peltier, Mühry holds that aqueous vapor is merely the conductor, or rather convector, bearing the electricity into higher regions. He suggests that it is more important to meteorology to observe the quantity than the kind of electricity, and that the simple straw electrometer of Volta will suffice, instead of the more delicate and complicated instruments that have been deemed necessary. The most important problems that are now remaining to be solved are, he thinks, the details of the geographical distribution in reference to latitude, longitude, and dry and moist climates.—*Harper's Monthly.*

A NOVEL AND SIMPLE ELECTRIC LIGHT.

Dr. Geissler, of Bonn, Germany, whose name is inseparably associated with some of the most beautiful experiments that can be performed by the agency of electricity, makes an electrical vacuum tube that may be lighted without either induction coil or frictional machine. It consists of a tube an inch or so in diameter, filled with air as dry as can be obtained, and hermetically sealed after the introduction of a smaller exhausted tube. If this outward tube be rubbed with a piece of flannel or any of the furs generally used in exciting the electrophorus, the inner tube will be illumined with flashes of mellow light. The light is faint at first, but gradually becomes brighter and softer. It is momentary in duration; but if the tube be rapidly frictioned, an optical delusion will render it continuous. If the operator have at his disposal a piece of vulcanite, previously excited, he may, after educing signs of electrical excitement within the tube, dispense with his flannel or fur. This will be found to minister very much to his personal ease and comfort. He may continue the experiment and with enhanced effect, by moving the sheet of vulcanite rapidly up and down at a slight distance from the tube. This beautiful phenomenon is an effect of induction.—*Scientific American.*

West India and Panama Telegraph.—The report shows that the receipts for the year amounted to £26,185, and the expenses, including interest, to £25,669, leaving a balance of £485. The unsatisfactory result of the twelve months' work is ascribed to the various interruptions in the company's cables, which are intimated to be due to their imperfect manufacture and laying. The suit between this company and the India-rubber Company is expected to result beneficially to the former. The subsidies received during the year have been only £5,401 out of the full sum of £16,800, some of the governments having withheld their payments during the interruptions.

The Brazilian Submarine Telegraph Company have notified that, owing to the tempestuous weather, which has prevented the opening of the first section of their cable between Lisbon and Madeira, they have agreed to a proposal of the contractors to defer sending the second section to sea until the Spring of 1874, and that the arrangement will enable the Board to postpone the payment of the final call until the 31st of March, 1874. It is anticipated that both the second and third sections will leave in April, when the repair of the first section will also be proceeded with, in order that the whole line may be in working order by the Summer of next year.

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NOTES AND QUERIES.

AUGUSTA, Arkansas.—Will you please advise me of the practicability of Watts & Co.'s Main Line Sounder; would you recommend it for general use on a circuit from one to two hundred miles? Whose box relay is best adapted for general use? An answer through JOURNAL or otherwise will greatly oblige.

Ans.—We can only answer that every man who advertises sounders in the JOURNAL makes them better than anybody else, so far as we know. Watts & Co.s' must be good, they advertise so well.

Please inform me through your paper why the cups of an Electropoion Battery foam over, and oblige the "STATE OF NEVADA."

Ans.—Just as men do when they fight. The foam is caused by the elements attacking each other.

A., who resides at "R.S," telegraphs B., at "S.C," asking B. where he can reach C. with telegram. B. refuses to reply to A., saying he does not want A. to know where C. is. Operator at "S.C" knows that C. is in the city, and could give A. the desired information. Would it be consistent for him to do so?

"PLUG."

Answer.—Certainly not.

A READER.—If consistent, please give, through your valuable paper, a brief description of the printing instrument known as "Gray's Patent." Also, Sholes & Glidden's type printer, and the method of constructing a "condenser" with an approximate formula of the inductive effect a given number of plates, of a given size, with given amount of battery, and oblige.

Answer.—We will do so whenever we have the data desired.

L. D.—Where can "Geo. D. Teller's American Telegraph, Post-office and Express Guide" be had, and what is the price of it?

How should a "pre-paid answer" be checked?

Ans.—Teller's Guide is published in Buffalo, N. Y. Price $8. Check a prepaid answer "collect."

Can the JOURNALS, to complete the files of this office from the beginning, be supplied, it only having the numbers from June 15, 1872?

Will provision be made for names of new offices when the space left for that purpose in the Tariff Book is full, or will each office make such arrangements to suit themselves? I notice that the blank space of two States is already filled. Please answer in next JOURNAL.—Very respectfully, R. Ck.

Ans.—We are unable to supply full files, some numbers being out of print. We are informed by the Tariff Bureau Department that offices are expected to insert a blank leaf for additional names until a new book is furnished, and which will not be long delayed.

To the Editor of the Journal of the Telegraph:

Some of the debaters on the proposed change of alphabet seem to think if the *spaced* letters were done away with, there would be no bulled messages. Perhaps not. A message was sent to a repeating office, addressed to "Dr. H. G. Westlake, Hillsdale, N. Y." Operator (?) gave O. K., and forwarded it to Dr. H. G. West, Lakeville, Ct. Another, sent same operator, read "Wright is nominated. Be here Tuesday, and I will explain." He sent it along: "Wright is comforted. Will be here Tuesday, and will explain." How is that?

That is a severe specimen.—ED.

ATMOSPHERIC ELECTRICITY AND OZONE

Was the title of a paper read by Dr. George M. Beard of New York, before the Sanitary Science Association. He said that it has been shown that there are two daily tides of positive atmospheric electricity. In the morning between 6 and 9 o'clock, the atmospheric tide is at its height, falling somewhat between 2 and 5 P. M., rising again between 6 and 9 P. M., and falling to a minimum between 2 and 5 A. M. Similar variations are noticeable in the months, the tide of atmospheric electricity being highest through the months of January and February, gradually subsiding in the months of March, April, May, June, July, and August, when it is at its minimum, and gradually rising again through September, October, November, and December. It has been stated that there is a relation between ozone and intermittent and remittent fevers; that rheumatism is prevalent when ozone is deficient; and that when ozone is in excess, diphtheria, scarlet fever, small pox, measles, scarlatina, and other cutaneous affections become prevalent.

Comparative researches regarding atmospheric electricity, if conducted to a large extent under government supervision, would help to explan the extraordinary stimulative character of the climate of California, to explain the fact that sunstrokes are almost unknown on the Pacific coast, and perhaps elucidate some of the unkown causes of other wonderous effects of our climate.

THE OPEIOSCOPE.

This is a new and simple instrument, suggested by Professor A. E. Dolbear, for the purpose of demonstrating the pulsations of sound. Take a tube of any material, from one to two inches in diameter, and anywhere from two inches to a foot or more in length. Over one end paste a piece of tissue paper or a thin piece of rubber or goldbeater's skin; either will do. In the centre of the membrane, with a drop of mucilage, fasten a bit of looking glass not more than an eighth of an inch square, with the reflecting side outward, of course. When dry, take it to the sunshine, and, with the open end of the tube at the mouth, hold the other end so that the beam of reflected light will fall on the white wall or a sheet of paper held in the hand. Now speak, or sing, or toot in it. The regular movement of the beam of light with the persistance of vision presents very beautiful and regular patterns, that differ for each different pitch and intensity, but are quite uniform for given conditions. If a tune like "Auld Lang Syne" is tooted slowly in it, care being taken to give the sounds the same intensity, a series of curves will appear, one for each sound and alike for a given sound, whether reached by ascension or descension, so that it would be possible to indicate the tune by the curves; in other words, it is true phonautograph.

THE recent establishment of a signal station at Havana, Cuba, brings to notice a number of meteorological observations that have been made at the Jesuit College in that city during the past twenty-five years. The regular publication of these observations and the deductions that may be drawn from them lead to the conclusion that science will receive very valuable aid from this station in the West Indies. The prevailing wind in this region never deviates more than a few degrees from the east. The total number of rainy days in the year is, on the average, one hundred. Numerous coincidences have been observed between magnetic disturbances and local storms or hurricanes, also between the former and auroras, visible perhaps in distant lands. On the other hand, very frequently the records at Havana show remarkable magnetic purturbations that have not been recorded by the photographic apparatus at Greenwich, England. The amplitude of the daily barometric range is least in June and July, and greatest in the winter months. Fourteen years of observations have been insufficent to determine any certain law respecting the years of hurricanes. They are, however, as is well known, far more frequent from July to January than during the other half of the year. A careful investigation of the terrible hurricanes of October, 1870, leads the Rev. R. P. B. Vines to the conclusion that the winds circulating around the centre of the cyclone describes a circle, and the whole cyclone describes a curve on the earth's surface, such as would be given by wrapping a spiral around a parabola, the folds of the spiral being closest at the apex of the curve. The rate at which the vortex of the cyclone of the 7th of October crossed the island of Cuba was only four miles an hour. The second storm, of the 19th of October, began moving at the rate of nine and a half miles, and increased to twenty miles an hour. The discharges of electric fluid were very intense, and at Cardenas an appearance similar to the aurora borealis were visible for ten minutes. The magnetic needles were very much disturbed. The rising of the sea under the centre of the cyclone is attributed by Vines to the low barometer prevailing there, to which also he attributes certain slight shocks of earthquake, due to the violent expansion of gases confined within the cavities that abound in the island.

THE American man of leisure is a sort of lost dog. The people are so busy, they have so long associated personal importance with action and usefulness, that it is all a man's life is worth to drop out of *active* employment. If a Vanderbilt should quietly release his hold of the vast railroad interests now in his hands, and should never more show his face in Wall street, he would practically shrink to a nonentity. If a Stewart should retire to enjoy his piled-up millions in the quiet repose of his palace, he would cease to be an object of interest to anybody. It is undeniably true that there is nobody in America who has so hard a time as the man of leisure. The man who has nothing to do, and nobody to help him do nothing, may properly be counted among the unfortunate classes, without regard to the amount of wealth he possesses. This is, doubtless, the reason why so many who retire from a life of profitable labor come back, after a few months or years, to their old haunts and old pursuits. They see that the moment they count themselves out of active life, they are counted by their old acquaintances out of the world. They become mere loafers and hangers-on; and a certain sense of vagabondage depresses them. The climate is stimulating, time hangs heavy on their hands, business is exciting, business associations are congenial and attractive; and so they go back to their industries, never to leave them again till sickness or death or old age removes them from the theatre of their efforts.—*Scribner.*

INFORMATION is wanted of Hiram McGonegal. Address U. S. McGonegal, Oak Orchard, Ottawa Co., Ohio.

THE friends of M. D. Buckwell desire to hear from him. VAN WEST, O.

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THE SERVICE.

WESTERN UNION TELEGRAPH COMPANY,

OCTOBER, 1873.

APPOINTMENTS.

W. N. More, 145 Broadway.
E. C. Boilean, "
P. V. DeGraw, "
J. W. Emerick "
J. S. Fitch, "
J. D. Washington, "
C. Thompson, "
Miss P. Lewis, "
Miss M. Logan, "
Miss S. Walker, Astor Place.
Miss A. R. Eaton, Astor Place.
Miss C. Kempton, Cooper U'n.
Sam. Simmons, St. Nich. Hotel.
Miss J. Gavoy, Greenp'nt, L.I.
C. E. Topping, West Hampton, L. I.
H. P. Tillinghast, Southold, L. I.
H. W. Smith, Ithaca, N. Y.
C. G. Waldo, Oswego, N. Y.
R. Mallett, Sharon Springs, N. Y.
J. E. Shultis, Coopers, N. Y.
J. Nichols, Limestone, "
E. N. Robinson, Port Jervis, N. Y.
H. A. Phelps, Rameeys, N. Y.
G. W. C. Day, Easton Station, N. Y.
T. Heine, Ellicott City, Md.
S. L. Bailey, Green Spgs. Run, W. Va.
C. Ferguson, Sykesville, Md.
W. L. Williams, Texas, W. Va.
F. Shalk, Volcano, "
D. S. Lyon, Winchester, "
C. C. Stearns, Bethel, Vt.
A. P. Densmore, Cavendish, Vt
D. J. Eastman, Lowell, Mass.
P. Mason, Oxford, N. H.
E. A. Crawford, Waverly, Ms.
C. F. Grover, W. R. Junc.
J. H. Dwight, Albany, N. Y.
Miss J. Dykeman, Cold Spgs., N. Y.
Miss M. L. Calmer, Garrison's, N. Y.
S. Lawrence, Hudson, N. Y.
R. Wilkinson, Poughkeepsie, N. Y.
W. R. Bates, Pownal, N. Y.
Miss S. A. Fisher, Yonkers, N. Y.
W. Hamilton, Boston, Mass.
Mrs. S. N. Garrish, Boston, Mass.
C. S. McCoy, Boston, Mass.
A. Davin. " "
C. E. Davidson, " "
Jas. Sullivan, " "
M. J. Fitzpatrick, Ottumwa, Ia.
O. M. Stone, Chicago, Ill.
A. L. Avery, " "
J. G. Harrison, " "
S. Musgrove, " "
S. O. Bracken, " "
R. C. Hayes, " "
G. A. Lied, " "
H. R. Myers, " "
F. D. Munson, " "
J. H. Marsh, Kansas City, Mo.
C. E. Turner, St. Louis, "
W. F. Pinson, " "
C. D. Barnum, " "
R. J. McCarthy, " "
Miss Mattie Rogers, St. Lo's, "
Wm. Nelson, St. Joseph, "
E. Duncan, Butler, Pa.
John Hanke, " "
G. W. Brittenbender, Carlisville, Pa.
Jno. Alger, East Brady's Bend.
W. C Howell, Jefferson, Ohio.
C. Johnston, Oil City, Pa.
Wm. Splane, Petrolia, "
J. F. Henrica, Pittsburg, Pa.
R. Salgards, " "
J. B. Bryant, " "
L. F. Stone, Allegan, Mich.
G. A. Howard, Alpena, "
E. H. Thatcher, Buffalo, N. Y.
A. B. Griswald, "
J. H. Simmons, Cleveland, O.
J. M. Robie, Detroit, Mich.
W. L. Logue, " "
J. M. Shaver, E. Saginaw, Mich
A. F. Prichard, Jamestown, N. Y.
Wm. Annin, Port Austin, Mich.
J. Mullerwein, Sebewaing, "
A. De Perwin, Tawas City, "
J. Staley, Jr., Unionville, "
J. H. French, Denver, Col.
A. M. Bush, Hughes, "
G. F. Stewart, Omaha, Neb.
C. M. Cunningham, " "
E. L. Armstrong, " "
W. R. Reid, " "
P. J. Tiernan, " "
N. Sequra, Trinidad, Col.
W. H. Glass, Indianapolis, Ind.
G. A. Berry, Chillicothe, O.
M. T. Savin, Charlestown, Ms.
Miss P. Kerwin, Cohasset Narrows, Mass.
Miss C. Gallop, Coventry Center, R. I.
Miss F. E. Clarke, East Thompson, Ct.
Miss M. H. McInerny, Millville, N. Y.
C. E. Appell, Mamaroneck, N. Y.
Miss C. A. Bessie, Newtonville, N. Y.
A. E. Scoville, New Milford, Ct.
Chas. Flagg, New Britain, "
C. Talmadge, Northford "
W. A. Hennessey, Springfield, Mass.
T. J. Aldrich, Worcester, Mo.
Miss Deliah Thomson, Maitland, N. S.
Miss G. Hadley, Pt. Mulgrave, N. S.
B. W. Flye, Clinton, Me.
J. Holt, Plaistow, N. H.
Miss Grace, Harrington, Me.
R. G. W. Dennison, Annapolis, Md.
W. T. Moore, Baltimore, Md.
C. F. Hutchinson, " "
A. A. Offuth, " "
Wm. Dunlap, " "
R. Livingstone, " "
John Phillips, Birdsboro, Pa.
W. W. Whitman, Canton, Pa.
W. F. Siddels, Christiana, "
J. H. Martin, Clearfield, "
E. R. Diebach, Donaldson, "
W. E. Miller, Duncannon, "
John Doyle, Elizabeth, N. J.
W. B. Hilliard, Trackville, Pa.
D. H. Rodney, Morrist'wn, N.J.
J. S. Allen, Pennington, N. J.
W. L. Hastings, Pennington-ville, Pa.
R. A Meyers, Philadelphia, Pa.
J. C. Cardwell, " "
S. A. Boyle, " "
R. D. Riley, " "
Wm. Prosser, " "
W. H. Bush, " "
J. D. Shine, Pittston, "
W. M. Wilson, Princeton, N. J.
W. L. Seldon, Roaring Branch, Pa.
— Quillman, Rogers' Ford, Pa.
R. E. Jameson, Wilkesbarre, Pa
E. F. Street, Council Bluffs, Ia.
J. F. Hoke, Cairo, Ill.
W. Baldwin, Davenport, Ia.
F. Ketchum, U. S. Yds., Ill.
J. W. Alvis, Knoxville, Tenn.
A. B. Bentley, Pleasant Hill, N. C.
H. A. Ashmore, Staunton, Va.
H. H. McKeirther, Wadesboro, N. C.
C. P. Hill, Weldon, N. C.
E. Morton, Augusta, Ga.
A. L. Woodward, Madison, Fla.
W. S. Jordan, Monticello Jc., Fla
J. A. Wilson, St. Marks, Fla.
W. E. Jackley, Augusta, Ga.
J. Soule, Lake City, Fla.
B. W. Norton, Chester, S. C.
J. T. McCants, Columbia, "
W. E. Robbins, Macon Sta., Ala
M. Barrow, Perdido, "
A. B. Stroud, Palmetto, Ga.
A. H. Plant, Bolling, Ala.
W. H. Nettles, Marion, Ala.
J. H. Riddick, Selma, "
J. W. Francis, Loochapoka, Ala.
W. Hall, Montgomery, Ala.
J. L. Jones, Letohatchie, Ala.
D. B. McMullen, Jemison, "
J. Savage, Blount Spgs., "
Jno. McNavin, Carroll, Tenn.
J. F. Davis, Columbus, Ky.
L. L. Crider, Danville, Tenn.
W. W. Polk, Frost, "
E. Burks, Gallatin, "
Mrs. J. C. Howell, Huntsville, Ala.
M. D. Lippit, Jackson, Tenn.
A. K. V. Hull, Louisville, Ky.
M. D. Gentry, Memphis, Tenn.
J. P. Lathrop, Walton, Ky.
W. H. Hartman, Earlington, Ky.
L. D. Moore, Forts, Tenn.
H. Stewart, Springfield, Tenn
J. Griffith, Monroe, La.
C. W. Booth, Hallville, Tex.
W. P. Gay, Little Rock, Ark.
C. F. Gordon, Balton's, Miss.
T. Willer, New Orleans, La.
J. J. Powers, " "
L. W. Bradley, " "
A. D. Babbitt, " "
J. E. Hocket, Chillicothe, O.
C. McIntyre, Indianapolis, Ind.
H. S. Rady, Alexandria, Va.
J. W. Ward, Athens, Tenn.
S. P. Stearns, Christiansburg, Va.
W. F. Williams, Durham, N.C.
W. W. Gibbs, G. W. Sulphur Springs,
R. B. Jarrett, Halifax, N. C.
W. G. Baird, Dallas, Tex.
P. S. Callahan, Overton, Tex.
W. A. Kennon, Navasota, "
M. E. McLeon, Columbus, "
J. J. Galivan, Galveston, " "
D. L. Ryan, " "
J. H. Lee, Austin, "
H. A. Du Souchet, Houston, Texas.

RESIGNATIONS.

G. W. Armstrong, 145 B'way.
A. B. Griswald, "
R. J. McCarthy, "
P. J. Tierney, "
W. J. Burns, "
H. J. McCormick, "
J. J. Powers, "
J. W. English, 134 Pearl St.
Theo. Agte, Castle Garden.
W. J. Hallock, 21 Wall St.
P. H. Dunn, St. Nich. Hotel.
Miss Carrie Trouchelet, Cooper Union.
Miss J. H. White, Williamsburg, L. I.
G. F. Clarke, Ithaca, N. Y.
R. Kimber, Niagara Falls, N. Y.
F. R. Hudson, Oswego.
W. F. Johnson, Middaughs, Pa.
W. T. Cantwright, Texas, W. Va.
D. A. Mudge, Volcano, W. Va.
H. N. Leach, Bethel, Vt.
D. W. Raulett, Bethlehem. N. H.
S. E. Wright, Cavendish, Vt.
Miss M. J. Catlin, Crawford House.
Miss M. J. Bancroft, Crawford House.
A. B. Hour, Glen House, N. H.
E. P. Adams, Gorham, N. H.
Miss J. L. Granville, Highgate Springs, Vt.
J. F. Stevens, Lowell, Mass.
M. R Thornet, Mt. Washington, Vt.
M. Priest, Mt. Washington, Vt.
P. E. Cushman, Oxford, N. H.
S. M. Weeks, Plymouth, "
J. F. Shorey, Profile House, N. H.
C. A. Sanborne, Twin Mt. House, N. H.
W. P. Merrill, Waumbeck House, N. H.
H. A. Dean, Waverly, Mass.
E. S. Keep, (dead) Albany, N. Y.
G. B. Murray, Clarendon Spgs., N. Y.
Miss J. Dykeman, Garrison's, N. Y.
J. E. Hurley. Hudson, N. Y.
J. E. Miller, Saratoga, "
A. A. Hendricks, Yonkers, N. Y.
Miss Ida Spencer, Boston, Ms.
A. B. Churchill, "
B. C. Keeler, "
John Clark, "
Dan Coughlan, "
M. H. Warner, Charlestown, Mass.
E. E. Long, Cohasset Narrows,
O. N. Clark, Et. Thompson, Ct.
Miss M. A. Thayer, Millville, Mass.
H. St. E. Austin, Cairo, Ill.
S. T. Shaefer, Ottumwa, Ia.
J. P. Davis, U. S. Yards, Ill.
Miss E. Stone, Chicago, Ill.
E. L. Pearson, "
L. B. Bobo, "
C. M. Cunningham, "
F. W. Farley, "
M. F. Smith, "
G. F. Stewart, "
C. T. Day, "
E. L. Armstrong, "
R. A. Myers,
Miss L. L. Gorham, Mamaroneck, N. Y.
Miss J. Smith, Newtonville, Mass.
S. M. Jennings, New Hartford, Ct.
Miss S. P. Hubbard, New Britain, Ct.
J. M. Todd, Northford, Ct.
C. S. McCoy, Newport, R. I.
R. E. Capron, Providence, R.I.
H. S. Martin, Springfield, Mo.
F. N. Cooke, Worcester, Mass.
Miss N. R. Treein, Amherst. N. S.
H. Logan, Maitland, N. S.
Miss L. C. Hadley, Point Mulgrave, N. S.
Miss S. B. Reynolds, Pembroke, Me.
Jno. Trefery, Wenham, Me.
F. L. Wheaton, Annapolis, Md.
H. Gentry, Jr., Baltimore, Md.
Jno. E. Shaffer, "
C. C. Yearks, "
L. D. Wilbourn, "
T. C. Davidson, Bedford Springs, Pa.
W. L. Barrett, Bricksburg, N. J.
G. B. Pennock, Bordentown, N. J.
G. Catherman, Canton, Pa.
J. S. Janney, Christiana, Pa.
H. M. Shelvin, Claymont, Del.
W. E. Hamar, Clearfield, Pa.
W. James, Donaldson, "
M. S. Branzen, Duncannon, Pa.
J. P. Borden, Elizabeth, N. J.
Thos. Edwards, Trackville, Pa.
Geo. Hopper, Gettysburg Spgs., Pa.
G. W. Shaffer, Glen Rock, Pa.
W. H. Boggs, Harrisburg, "
A. F. Shank, Liverpool, "
M. Shine, Mauch Chunk, "
W. D. Tyler, Minnequa, "
N. Harris, Morristown, N. J.
J. D. Parvin, Pennington, N. J.
A. Offuth, Penningtonville, Pa.
S. O. Bracken, Philadelphia, Pa.
E. C. Boilean, "
P. V. DeGraw, "
J. T. Henneberry, "
H. H. Johnson, "
E. C. Morton, "
W. H. Pusey, "
T. E. Jones, "
P. Connor, "
W. H. Yoder, "
D. H. Rodney, Pittston Pa.
Jos. Ross, Pottsville, Pa.
Jno. Doyle, Princeton, N. J.
E. O. Hendrickson, Roaring Branch.
Wm. Miller, Rogers' Ford, Pa.
J. B. Shine, Water Gap, "
J. W. Collins, Wilkesbarre, "
M. L. Reed, Council Bluffs, Ia.
E. G. Greene, Hughes, "
W. D. Linton, Omaha, Neb.
A. C. Barker, "
T. W. Cox, "
C. B. Brown, "
A. Morrison, Salt Lake, Utah.
W. H. Reed, Trinidad, Col.
Miss C. Whitson, Indianapolis, Ind.
J. F. Slover, Athens, Tenn.
J. C. Wade, Christiansburg, Va.
J. H. Walsh, Danville, Va.

TRANSFERS.

Name.	*From.*	*To.*
G. A. Brooks	Oil City, Pa	Modoc City, Pa.
Miss M. E. Brittain	So. Brooklyn, L. I.	145 Broadway.
Miss Kate Doyle	West Hampton, L. I.	So. Brooklyn, L. I.
Miss K. Doubleday	Astor Place	145 Broadway.
Miss Annie Elliott	145 Broadway	14th st. and 3d av.
M. T. Galvin	St. Nicholas Hotel	516 Broadway.
Miss Mary Dickinson	145 Broadway	Cooper Union.
J. J. Gartlan	Washingt'n Mark't.	134 Pearl st.
C. H. Hildreth	6th av. and 42d st.	A-hland House.
J. E. Hurly	Hudson, N. Y.	145 Broadway.
M. B. Leonard	Washingt'n Mark't.	"
Miss S. P. Moore	145 Broadway	23d st. and 8th av.
M. V. Morgan	"	Fifth Av. Hotel.
Miss L. Nash	Astor Place	145 Broadway.
S. D. Riddle	Westchester House.	21 Wall st.
Herbert Smith	Canal st.	145 Broadway.
C. E. Tapley	6th av. and 9th st.	Station H.
Miss Christian Welsh	Greenpoint, L. I.	Williamsburg, L. I.
L. W. Ballon	CoventryCentre, RI.	Providence, R. I.
Miss Hall	Harrington, Me.	Pembroke, Me.
Jno. Stalups	Washington, D. C.	Lake City, Fla.
R. W. Aycock	Dallas, Tex.	Houston, Tex.
E. J. Smith	Red River City, Tex.	Dallas, "
W. N. Monley	Galveston, Tex.	Houston, "
J. T. Hull	Galvest— Tex.	Bryant,

HONOR TO WHOM HONOR IS DUE.

MEMPHIS, TENN., Nov. 24TH, 1873.

I see no mention has been made in the JOURNAL of the fact that the managers and employés of the Memphis office, during the prevalence of the late yellow fever epidemic, when more than a thousand were sick, and hundreds dying daily around them, and when every citizen had left the city that could leave, remained bravely at their post. The names of these brave men should be published and their worth acknowledged. Their names are as follows:

G. M. Baker, Manager.
D. O. Dyer, Chief Operator.
Howell Sigler, Assistant Chief Operator.
I. J. Fowler, Operator.
Chris. Reilly, Operator.
Marco Paoli, Operator.
Peter Fowler, Operator.
Charles H. Patch, Operator.
* Cornelius McCarthy, Operator.
E. W. Gibson, Operator.
* J. N. Rust, Operator.
G. A. Putnam, Operator.
W. H. Joyce, Book-keeper.
C. H. Howe, Assistant Book-keeper.
E. A. Gaston, Clerk.
Charles Marable, Clerk.
W. W. Brown, Office Boy.
J. M. Mullins, Office Boy.
William Clements, Battery-man.

* Mr. McCarthy died with and Mr. Rust had the fever.

WELLINGTON.

AN ECONOMICAL COPYING PRESS.

CHICAGO, Nov. 27, 1873.

I will endeavor to redeem the promise made to you recently, that I would give you in writing a few points in regard to copying messages. Several times when traveling I have asked operators at railroad stations if they retain copies of Western Union messages. They have always answered that they do; but as they are not provided with letter presses, have to write out copies. I will suggest for the benefit of the telegraphic fraternity a simple method by which messages can be copied more easily and rapidly without a screw press than with one.

Two years ago I saw the manager of a St. Louis office copying messages with a large wooden rolling pin more rapidly and easily than it could be done with a press. I presume the same rolling pin has been in use ever since The process consists in making the pile of messages with dampened sheets between, the same as for the press, and then rolling the pin over them once or twice with a moderate pressure.

In Chicago office an iron roller hung in a bale with a handle has been in use a long time. The weight of this iron roller is sufficient without any other pressure. When not in use it is rolled into a trough or groove at the back edge of the table, where it is out of the way.

The wooden rollers can be supplied to railroad stations or small offices on requisitions from District Superintendents. I am having some iron rollers made for use in the larger commercial offices in Central Division. Letters can be copied in a book with one of these iron rollers as well as with a screw press.

I have seen clothes wringers used in some offices for copying messages; but in my opinion the rolling pin does the best work and the most easily.

Another feature of this method that ought to recommend it at the present time is its cheapness. Screw presses are expensive and are quite apt to get broken.

Very truly yours,

THOMAS ORTON.

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Journal of the Telegraph.

This Journal is issued on the 1st and 15th of each month. Its circulation is over 8,000. It goes to every State, Territory and Province on the Continent. It has become a necessity, and is always welcomed as a friend. No better medium for advertising exists.

TERMS:

TWO DOLLARS PER ANNUM IN ADVANCE.

Address—

JOURNAL OF THE TELEGRAPH,
Western Union Telegraph Company,
145 Broadway, New York.

NEW YORK, DECEMBER 15, 1873.

MANY subscriptions to the JOURNAL expire with the close of the volume. As the paper is invariably stopped at the expiration of the term it will be well for those who desire to keep posted in current telegraphic information to renew at once.

WE are tempted to give notice that no communications will hereafter receive attention which are not written with such care as to enable us to hand them to the printer without labor of our own. Some really valuable papers come to us so shabbily, that they merit no courtesy at our hands. If it is worth writing to us at all, it is worth a little care in making your paper intelligible and fit for use.

THE HUBBARD JOB ONCE MORE.—Mr. Ramsey has introduced a bill in the Senate to provide for transmission of correspondence by telegraph. In all substantial particulars it is identical with the so-called "Hubbard bill," for connecting the telegraph with the postal service, which has been introduced in preceding Congresses and fully published. Its main feature is an authorization for the Postmaster-General to contract with the proposed Hubbard Postal Telegraph Company for transmitting correspondence by telegraph as his agent.

WE have received from Washington a lengthy and excited detail of a fraud said to have been practiced on an operator in the Department of the Interior of that city. It would make good reading, no doubt, but we cannot publish it. The manager who will take a message from a "Notorious Hotel and Telegraph Beat," and send it before payment is made, deserves to suffer loss. Nor can we see that we are called upon to publish the name of the cheater to assuage the feelings of the cheatee. A communication showing that a telegraph manager accepted a message at Washington, D. C., to be delivered in Brownsville, Texas, in 15 minutes, would only prove that there was a very soft man somewhere at the National Capitol, and who would be damaged much more than the author of his wrongs. We hope his loss of $5.73 will leave him a wiser and a better man.

WORK WELL DONE.

As we write these closing words of the year, we are glad to be able to associate therewith an admirable piece of telegraphic work. Success is always pleasant. In the case before us, it is especially so, because the success reveals the means by which it was accomplished.

The transmission of the President's Message, by telegraph, throughout the country, has come to be regarded as a test, not only of the capacity and mechanism of the lines employed, but of the direction and manipulation. Failure in either would, of necessity, neutralize and obscure the others. Skill in the arrangement of the details and force employed, intelligent precision and conscientiousness in labor, and perfect mechanical conditions, are all needed to make each available. When, therefore, these are found in combination, a system more or less perfect may be presumed. The transmission of the recent message of President Grant, we think, illustrates such a condition of telegraphic service, and on which the country may properly congratulate itself. It gives evidence that, year by year, communication by telegraph is assuming easier and more harmonious conditions. And the advantage of these special performances is, that they reveal the employment of positive administrative talent in the current execution of telegraphic work. We cannot illustrate this better than by giving our readers the following reports.

FROM MANAGER A. S. BROWN.

NEW YORK, Dec. 3d, 1873.

GEN. T. T. ECKERT, Genl. Supt.:

As a record which may be useful for future reference, I respectfully present the following report of a part of yesterday's press work. The President's Message, containing 10,635 words, was received here, from Washington, on eight wires, with drops at Baltimore and Philadelphia. Its reception commenced at 1:13 P.M., New York time, and was completed in an average of fifty-nine minutes.

Six manifold copies were taken, four of which were delivered to the Associated Press, and the other two used for sending from New York to the Western and Eastern Press.

Accompanying the Message were the text of the Spanish Protocol (490 words) and a synopsis of the report of the Secretary of the Treasury (515 words.)

The President's Message, Protocol and synopsis, were sent to Boston on four wires, dropping copies at New Haven, Hartford, Springfield, Worcester, and Providence. On these circuits, the report was finished at 3:40 P.M.

To the Western press, the reports were sent on four wires, finishing at 3:25 P. M.

Notwithstanding the very unfavorable weather—a thick, drizzling rain prevailing at the time, and for the previous twenty-four hours—the entire report was received here and forwarded East and West, in better time, and, I think it safe to say, in better shape, than ever before.

Very respectfully,
A. S. BROWN.

FROM SUPERINTENDENT BATES, PHILADELPHIA.

THOMAS T. ECKERT, Genl. Supt.:

The President's Message was handed to us, in Washington, at 1 P.M., and was sent to Baltimore, Philadelphia, and New York, on eight wires. The first closed in forty-two minutes; the last, in eighty minutes. There was some interruption, caused by sleet; otherwise, the transmission would have been completed in three-fourths of the time employed. Regular business suffered no delay. The Message was sent to Pittsburgh for the Western Press, in three hours, by four wires, the sleet preventing greater speed. To Pottsville, Pa., it was sent in two-and-a-half hours, against four-and-a-half hours taken by the Automatic Company.

D. H. BATES, Supt.

Commenting on this excellent performance, the *New York Tribune* says: "Credit is due the officers and operatives of the Western Union Company for the excellent arrangements made and the manner in which they were carried out. The connection of the different portions of the matter was perfect, and not a break or omission occurred from beginning to end. The entire report—12,325 words—passed through the Associated Press office in one hour and twenty minutes, and was all in the offices of the evening papers at 2:30 P.M."

It may be said that the speed of transmission was not extraordinary. The average was 1,540 words per hour. 2,500 words have been transmitted in a similar period, in certain test cases. But when the exceeding accuracy of the work is considered, and the fact that six copies were manifolded by each receiver, we regard Mr. Brown quite justified in claiming for the execution unusual excellence and success.

In the inaugural address before the French Association for the Advancement of Science, the President, M. de Quatrefages, said: "The devotees of literature accuse science of stifling sentiment and imagination. What!" answers the President, "science stifle sentiment, imagination, she who brings us every hour into the presence of wonders! She lower intelligence who touches on all the infinities! When *litérateurs* and poets know science better, they will come and draw from her living fountain; like Byron of our time, like Homer of yore, they will borrow from her striking imagery, descriptions whose grandeur will be doubled by their truth. No, the study of science will never suppress the genius of an inspired poet, of a true painter, of a great sculptor. But she will bring more light to the path of an erring soul. She will, perhaps, transform into a wise man, or, at least, into a citizen, useful to himself and others, one who, without her, would only have been one of those pretended incomprehensible geniuses, destined to perish of misery, of impotency, and of pride."

THE testimony of twenty years' experience in deep sea cables goes to show that the insulating substance suffers nothing from continued submersion in sea water. On the other hand, it is known that the great pressure to which a deep sea cable is subjected tends to increase the density and, consequently, the efficiency of the insulator.

ANOTHER ARGUMENT IN FAVOR OF POSTAL TELEGRAPH.—On the night of November 18, Exeter Hall was filled with the employés of the London Post-office, who had met to enforce their claims to higher pay. A member of Parliament was in the chair, and a number of prominent politicians were on the platform. The "sense of the meeting" was that the pay received by the men was not sufficient to keep them from starving.

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CLOSE OF VOLUME VI.

With this issue the Sixth Volume of the JOURNAL OF THE TELEGRAPH is brought to a close, and when we say that the closing volume is the best of the series we are confident that our assertion will be fully confirmed by the judgment of our readers. The JOURNAL has not been given to trumpeting its own praise—it has not been necessary ; its contents, and the care and expense which have been bestowed upon it are sufficient evidences of excellence. As a class journal, devoted to the highest interests of the telegraph profession, it has aimed to be the standard authority, and every effort will continue to be made to maintain this position. Illustrated articles of great value and interest to both professional and non-professional readers have been regularly given, and this feature will be continued in the coming volume. The Answers to Correspondents in each issue is not the least interesting feature of the JOURNAL. Information of much value to the telegraphist has, in this manner, been conveyed, to the manifest improvement of the service.

The JOURNAL began existence with eight pages and a circulation of about three thousand. It was not established with the view of making a profit from its publication, but to provide a vehicle of communication between the officers of the Western Union Telegraph Company and their employés. Hence the terms of subscription and the rates charged for advertising space were placed at figures much below remuneration. These rates have been continued to the present time.

But the JOURNAL of to-day is something very different from the same paper in its inception. Not only has it fulfilled the purpose for which it was established, but it has supplied the want of a first-class paper, devoted to the interest of both the telegraph and its workers. From eight pages it has grown to sixteen, while the circulation has increased from three thousand to nearly eight thousand, and still steadily progresses.

The growth of the business of the telegraph is something marvelous, and seems to be without limit. So the value of a journal keeping pace with this growth, an epitome of every event transpiring in its history, and as a leader and teacher in its progress, cannot be too highly estimated.

The greatly increased expense attending upon the JOURNAL, in its present improved form, no longer allows it to be published at the nominal price heretofore charged. In this view, and with the knowledge of its merit, it has been decided to advance the rate of subscription to two dollars per annum, except to those in the employ of the Western Union Company; to the latter the price for one copy will remain as heretofore, one dollar per annum.

A Telegraph Cable Construction Bill is passing through the New Zealand Parliament. It is intended to promote the laying down of a cable between Australia and New Zealand, and of a duplicate line between Queensland and India.

TRANSFER SERVICE.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
NEW YORK, December, 6th, 1873.

To all Transfer Agents and Offices:

Applications are constantly received by telegraph at this office from regular transfer offices, for authority to transfer sums in excess of one hundred dollars in order to accommodate customers. Such requests occasion much unnecessary correspondence. It should be generally understood that—

No Transfer Office will be permitted to transfer an amount in excess of the limit prescribed by regulations. Customers should be advised that our rules in this particular are imperative and admit of no exception.

In connection with this subject, the attention of Transfer Agents is called to the fact that inquiries and explanations in regard to transfer orders are made in some instances directly between the offices concerned. This practice is improper and should be discontinued. All correspondence relating to the service must be conducted through the transfer agents. Offices should be instructed to disregard communications received from any other source, and to forward the same by mail to their Transfer Agent.

ADDRESSES.

The following definition of the rules in regard to "addresses" is published for the information and guidance of all concerned.

The address of the payee of a transfer may be, either *the street and number*, or the words "*asking transfer*," "*will call*," or "*address known*," according as circumstances may require.

One of these four forms of address must be used in each case, with this exception: that whenever the address of the payee is given at a Hotel, Post-Office, Bank or other well known public building, the street and number may be omitted.

The same rules will apply in cases where the sender addresses the payee in care of another party ; for example : "Pay John Smith, care Duncan, Sherman & Co., *address known*, New York."

GEO H. MUMFORD, *Vice-Pres't.*

The headquarters of Superintendent Hibbard of the Central Division is at Salt Lake City, Utah, and not at Omaha, Neb. All communications to him should be addressed to the former place.

A letter dated Missouri, presents the following case: "I received a message the other day to the Sheriff of this county. He was not at home, and would not return until the following day. Message was to arrest horse thieves. I saw the thieves pass not long before message was received. If I had made known contents of message, the thieves could have been caught. I said nothing about it. Some say I was wrong in not letting facts be known. Was I right or wrong?"

Answer. You were quite right. Your acting otherwise might have secured the thieves, but it would have violated the sacredness of the telegraph, which is worth much more than the rascals who escaped the clutches of the absent officers.

The acknowledgment of receipts by the Telegraphers' Mutual Benefit Association, will appear in the next issue.

TARIFF BUREAU.

SEMI-MONTHLY CIRCULAR.

EXECUTIVE OFFICE,
WESTERN UNION TELEGRAPH COMPANY,
145 BROADWAY, NEW YORK,
December 15, 1873.

To all Offices on W. U. Lines:

Managers are requested to send their post-office address, if different from the name of their office, to the Tariff Bureau for publication.

The following changes and additions have been made since the date of the last Circular:

GENERAL INFORMATION.

Clarendon, Ark., closed.
Coloma, Cal., re-opened.
Kingston, Cal., closed.
Firebaugh's Ferry, Cal., re-opened as an other line of tariff, 60 30 from San Juan South ; ck. San Francisco.
Rocklin, Cal., re-opened as an other line office. Tariff 30 10 from Sacramento; ck. San Francisco.
Derby, Conn., closed.
The P. O. A. of Birmingham, Conn., is Derby.
The P. O. A. of Baylis, Ill., is Pineville, Pike Co.; of Gurnee, Ill., P. O. A. is O'Plain, Lake Co.; and of Sheffield, Green Co. Ill., the P. O. A. is Rock Bridge, Green Co.
Sulphur Springs, Ind., closed.
The P. O. A. of Sand Prairie, Iowa, is Vincennes, Lee Co.
Kingsville, Parker, Stranger, and Hartford, Ks., closed.
Rowlandsville, Md , is now a W. U. office, square 67; check direct.
The P. O. A. of Utica Plank, Mich., is Frazer, Macomb Co.
Somerset and Rifle Lumber Boom, Mich, closed.
The notice in relation to Austin, Minn., given in JOURNAL of November first, 1873, is hereby countermanded.
Hereafter, the "Tariff for Other Lines" to Meriden and Waseca will be 100 and 7, and to Madelia, St. James and St. Cloud, Minn., will be 125 and 8 from Chicago, Ill.
Booneville, Miss., re-opened ; square 331.
Bushnell, Neb., closed.
Sidney, Neb., is now an Other Line office. Tariff for Other Lines 65 and 4 from North Platte, Neb., and 65 and 4 from Cheyenne, Wy.
Hereafter the "tariff for Other Lines" to Big Springs, Julesburg and Lodge Pole, Neb., will be 65 and 4 from North Platte Neb., and to Antelope and Potter, Neb., 65 and 4 from Cheyenne, Wy.
Orford, N. H., closed.
Clayton, N. J., re-opened.
Hainesport, N. J., closed.
The P. O. A. of Murray, Orleans Co., N. Y., is Hindsburg, Orleans Co.
Panama, N. Y., changed to Watts' Flats.
Barlow, O., closed.
Centerton, O., closed.
Big Run, O., closed.
Berwick, O., changed to Green Camp.
Frankfort, O., closed.
Newton, O., changed to Broadway.
Petrea, O., closed.
Potter, O., changed to Pottersburg
The P. O. A. of Big Walnut, O., is Taylor's Station, Franklin, O.
Green Springs, O., closed.
Madeira, O., closed.
Raysville, O., closed.
Tresckow, Pa., closed.
Suttons, Pa., changed to Geneva.
Waynesburg Junc., Pa., the office on Other Lines, printed in tariff book, is in Chester Co.
Messages may be taken for Spring City, Chester Co., Pa Send and check business to Royer's Ford, Pa.
Ophir, Utah, re-opened.
Messages addressed to the Navy Yard near Norfolk, Va., should be sent and checked to Portsmouth, Va.
Windom, Wis.—no office at this point.
Fort Sanders and South Pass, Wy., closed.

NEW OFFICES.

286 Shorter's Station, Ala.
401 Jacksonville, Ark.
401 Kensett, Ark.
196 Crawfordsville, Ga.
217 Social Circle, Ga.
347 Decatur Junction, Ill.
525 Garfield, Ks.
465 Severance, Ks.
84 White Fish Point, Mich., P. O. A., Sault St. Marie.

Tariff to square 34, in the northern part of Michigan, will be as follows : $1 from offices in squares 127 and 128 ; $1.50 from offices whose rate to square 127 is 40, 50, or 75 cents ; $2 from

offices whose rate to square 127 is $1 or $1.25; and $2.25 from offices whose rate to 127 is $1.50. It must be understood, however, that offices having a State rate to Michigan will use it on messages to offices in square 34.

Half-rate messages will not be taken for, or received from, Sault St. Marie and white Fish Point, Mich.

* Fort Snelling, Minn.,	100	7	307	Chicago, Ill.		
* Nicollet, "	125	8	307	"		
* Rose Creek, "	100	7	307	"		
* Windom, "	150	10	307	"		
* Beckwith Road, N. B.,	30	2	3	Sackville, N.B..	Mont. Co.	
* Canaan, "	30	2	3	"	"	
* Amityville, L. I., N. Y.	30	2	33	Babylon, L. I., N. Y.		
* Bicknellville, N. Y.,	25	1	38	Montreal Junc.,	Mont. Co.	
* De Kalb, "	25	1	74	Oswego, N. Y.	Mont. Co.	
* Fisher's Landing, N.Y,	25	1	74	"	"	
* Islip, L. I., "	25	2	33	Babylon, L. I., N. Y.		
* Heuvelton, "	25	1	74	Oswego, N. Y.,	Mont. Co.	
83 King's Ferry, "						
* Massena Springs, "	25	1	38	Mont. Junc.,	Mont. Co.	
* Moore's Forks, "	25	1	38	"	"	
* Oakdale, L. I., "	30	2	33	Babylon, L. I., N. Y.		
* Patchogue, L. I., "	35	2	33	Babylon,	"	
* Sayville, L. I., N. Y.,	35	2	33	Babylon.	"	
36 Shushan,, N. Y., ck.	Cambridge, N. Y.					
130 Watt's Flats, N. Y.						
* West Chazy, "	25	1	38	Mont. Junc.,	Mont. Co.	
33 Winfield, L. I., "						
212 Broadway, O.						
169 Collamer, O.						
212 Centreburg, O.						
191 Danville, O.						
212 Galena, O.						
212 Green Camp, O.						
212 Pottersburg, O.						
212 Sunbury, O.						
212 Westerville, O.						

* Avening, Ont.	* Lachute Mills, Ont.
* Baby's Point, Ont.	* Lowville, "
* Ballycroy, "	* Lyndhurst, "
* Bismarck, "	* Manchester, "
* Bloomfield, "	* Mara, "
* Brinston's Corners, Ont.	* Morpeth, "
* Brown's Wharf, "	* Newstadt, "
* Buckhorn, "	* New Dundee, "
* Cayuga Station, "	* Norval Station, "
* Charing Cross, "	* Ottercliffe, "
* Cheltenham, "	* Perry, "
* Columbus, "	* Portage Road, "
* Comber, "	* Port Metcalfe, "
* Conestoga, "	* Presque Isle, "
* Cookstown, "	* Rideau Station, "
* Courtland, "	* Ridgtown, "
* Courtwrights, "	* Salmonville, "
* Crediton, "	* Sidney, "
* Cumminsville, "	* Smithfield, "
* Delta, "	* Smithville, "
* Duart, "	* South Mountain, Ont.
* Duntroon, "	* Sparta, "
* Eastwood, "	* Springfield, "
* Edgar, "	* Stapleton, "
* Enterprise, "	* St. George, "
* Fletcher, "	* Taylor, "
* Formosa, "	* Thornhill Station, "
* Fred'cksburg Sta., "	* Valetta, "
* Gladstone Sta., "	* Van Burgh, "
* Goderich Harbor, "	* Washago, "
* Indiana, "	* Waterford Sta., "
* Inkerman, "	* Westmeath, "
* Judsonville, "	* Wilkesport, "

150 Geneva, Pa.						
150 Swanville, Pa.						
* Waynesburgh, Greene Co., Pa.	40	3	151	Pittsburgh, Pa.		
*Amqui, Quebec,			* Paton's Cove, Quebec.			
* Bainsville Sta., Quebec.			* Price's Cove, "			
* Bebee Plains, Quebec.			* R. du Loup Wharf, Quebec.			
* Chapeau, "			* St. Esprit, "			
* Chichester, "			* St. Jerome, "			
* Fort Coulonge, "			* Napierville, "			
* Gatineau Boom, Quebec.			* St. Julian, Quebec.			
* Grecis Point, "			* St. Lin, "			
* Hochelaga, "			* St. Pierre du Sud, "			
* Indian Cove, "			* Ursule Mills, "			
* Mascouche, "			* Waltham, "			
27 Fairlee, Vt.						
* Medford, Wis.,	100	7	307	Chicago, Ill.		

To "*Half Rate offices*," on and after December 15th, 1873, night messages may be taken for, and received from, Jacksonville, Palatka, and St. Augustine, Fla., at half-rates for W. U. lines, to and from Lake City, and full rates for "Other Lines" beyond Lake City, Fla.

CUBA CABLE BUSINESS.

We are notified that communication by telegraph is now established between Aspinwall and Panama. Tariff, in addition to the rate to Aspinwall, is one dollar, gold, for ten words, and five cents for each additional word.

WILLIAM ORTON, *President.*

Postmaster Burt, of Boston, recently gave a lecture on the postal service in that city, and illustrated the proverbial carelessness of letter-writers by showing his audience two hundred letters, taken in the office the previous day, which were not properly prepaid or directed, and two hundred and fifty postal cards with all sorts of messages on the face, but not a sign of a direction on the back.

THE Western Union Telegraph Company accomplished the truly marvelous task of transmitting the Message, containing about ten thousand words, in two hours and a half. Unfortunately, we were unable to keep pace with it in setting it up, and, consequently, could only reach one of the evening trains. In order, however, to give this very important document an early circulation, we employed private conveyances to take it to the towns immediately surrounding us, so that the citizens of Pottsville, Palo Alto, Port Carbon, St. Clair, Mt. Carbon, Schuylkill Haven and Minersville were afforded an opportunity before going to rest for the night. We print on our first page to-day the full text of the document, thus insuring the receipt by all of our friends of the President's message to the Forty-third Congress.—*Pottsville (Pa.) Standard.*

Mr. Q. A. STEPHENSON has resigned his position as Superintendent of Telegraph and Train Master on the Peoria, Pekin and Jacksonville Railroad, and will engage in private business.

INJURY TO TELEGRAPH WIRES IN CANADA.—A gale of wind of unusual severity prevailed on the lake coast of Canada on the 4th instant. The telegraph lines in the vicinity of Toronto suffered to a great extent, communication West and North from that city being entirely suspended.

BORN.

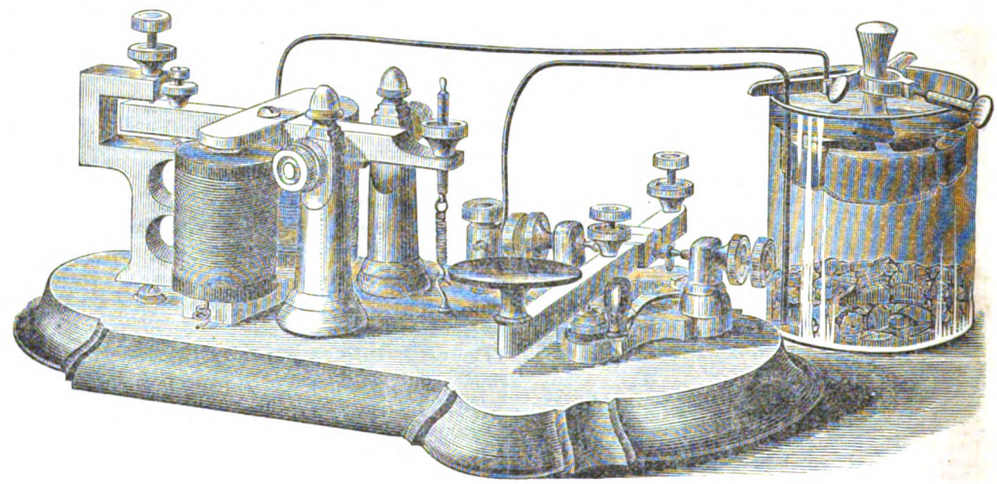
FINNON.—At White Hill, New Jersey, Nov. 19, 1873, to Mr. James Finnon, lineman, Amboy Division, a daughter.

DIED.

BINGHAM.—In Lewes, Del., on night of the 12th inst., from chronic dysentery, Ella Elizabeth, youngest daughter of Wm. E. and Anna E. Bingham, aged 16 months and 22 days.

LARISH.—At Buffalo, N. Y., Nov. 27, 1873, Mary E. Bonney, wife of Jos. W. Larish, of the W. U. Tel. Office.

WOODARD.—At Waterford, Pa., Nov. 20, 1873, Morse Whitney, son of Anson H. and Emma A. Woodard, aged 11 months and 4 days.



PARTRICK, BUNNELL & CO.'S

Champion Learners' Instruments.

COMBINED No. 1 SOUNDER AND KEY, with
BATTERY, OFFICE WIRE, CHEMICALS, and a thorough
BOOK of PRACTICAL INSTRUCTION in the Art of Telegraphy

Which latter gives all necessary directions for setting up the Battery and complete apparatus, and operating them for practising or communicating purposes.

THIS IS WARRANTED TO BE, BEYOND ALL COMPARISON, THE BEST APPARATUS EVER OFFERED FOR THE USE OF STUDENTS OF TELEGRAPHY.

Being excellent Morse instruments, substantially made and nicely finished, with nothing left out of their construction which pertains to a Complete Sounder and Key Combination Set. Nothing made in miniature, or in awkward and unusual shape, as is done with the very cheap affairs usually offered as Learners' Apparatus. They are equally well suited

For TELEGRAPHIC SCHOOLS OF INSTRUCTION, For PRIVATE TELEGRAPH LINES, and
For CITY WIRES OF TELEGRAPH COMPANIES.

The BATTERY which accompanies the Learners' Outfit is a full-sized Callaud, the same as the best cells used by Telegraph Companies for main battery, and gives sufficient power to produce a loud, clear sound from the instrument, the Sounder of which embodies the same remarkable principles of sound which have made our "Giant Sounders" so famous and popular among telegraphers.

The BOOK OF INSTRUCTION is a clear and practical explanation, by an experienced telegrapher, of every fact and principle of modern telegraphy and its apparatus which a student of the art could possibly require to obtain, in undertaking to become an accomplished sound operator.

PRICE OF APPARATUS complete, with Book of Instructions, Battery, Wire, and all necessary materials for one complete office outfit, ready for shipment, $10, sent by Express, C. O. D.; or $9.50, if money order for that amount be sent in advance. The latter plan will additionally save the purchaser the Express charges for returning money.

PARTRICK, BUNNELL & CO.,
38 South Fourth Street, Philadelphia.

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PENSACOLA TELEGRAPH CO.

C. L. LE BARON,

CHARLES LE BARON, JR., *President.*

Sec'y and Treasurer.

PENSACOLA. FLORIDA.

OFFICES IN

PENSACOLA, FLA. FERRY PASS, FLA.

MOLINO, FLA. MILTON, FLA.

PENSACOLA JUNCTION, FLA. BAGDAD, FLA

Connect with the lines of the WESTERN UNION TELEGRAPH COMPANY at Pollard, Ala.

Governed by the same Rules and Regulations as the Western Union Telegraph Company.

SECOND-HAND RELAYS.

A large lot of well polished and good working Relays for sale cheap.

Also several sets of

HICKS' REPEATERS,

In perfect order, at a nominal price.

GEO. H. BLISS & CO.,
41 Third Avenue,
Chicago, Ill.

RED STAR LINE.

ANTWERP SERVICE.

APPOINTED TO CARRY THE BELGIAN AND UNITED STATES MAILS.

		From Antwerp.	From Philad'a.
"VADERLAND," Captain Vander Heyden,	2800 tons.	Nov. 12.	Oct. 22.
"RYDAL HALL," Captain Collin,	2114 tons.	Oct. 11.	Nov. 5.
"NEDERLAND," Captain H. W. James,	3000 tons.	Oct. 25.	Nov. 22.
"SWITZERLAND," Captain ——,	3000 tons.	Building.	

PRICES OF PASSAGE:

Cabin.....$100 gold.
Steerage.....35 currency.
Prepaid Certificates, $36 currency.

LIVERPOOL SERVICE.

	Tons.	Master.	From Liverp'l.	From Philad'a.
"ABBOTSFORD,".....	2538.	Findlay.	Oct. 29.	Nov. 20.
"KENILWORTH,".....	2538.	Putt.	Nov. 12.	Oct. 23.

PRICES OF PASSAGE:

Cabin.....$100 gold.
Steerage.....30 currency.
Prepaid Certificates, $32 currency.

Tickets will be sold here at lowest rates, good from Antwerp and Liverpool to all interior points in the United States, *via* the Pennsylvania Railroad and its connections, thus affording parties in this country a convenient and cheap opportunity of sending for their friends in Europe.

THE RED STAR LINE will give special attention to the comfort of steerage passengers; comfortable berths, well-ventilated sleeping apartments and good food will be furnished them.

An experienced Surgeon is attached to each vessel.

Freight will be received at all principal points in the West and South, in connection with the Pennsylvania Railroad, Southern Mail Steam-ship Company and Clyde's lines, and through Bills of Lading issued for Antwerp, Bremen, Hamburg, Havre, Amsterdam, Rotterdam, Liverpool, London, Glasgow, Belfast, Hull and Leith.

The Red Star Line docks at Philadelphia are in direct connection with the Pennsylvania Railroad, and all merchandise intended for points beyond Philadelphia can be transferred from the hold of the steamer to the cars without the expense to shippers and risk of damage by re-handling, which results from cartage.

For rates of freight and passage, and other information, apply to

PETER WRIGHT & SONS,
GENERAL AGENTS, PHILADELPHIA.

William Hunter & Co., Agents, Liverpool. | B. Vonder Becke, General European Agent, Antwerp.

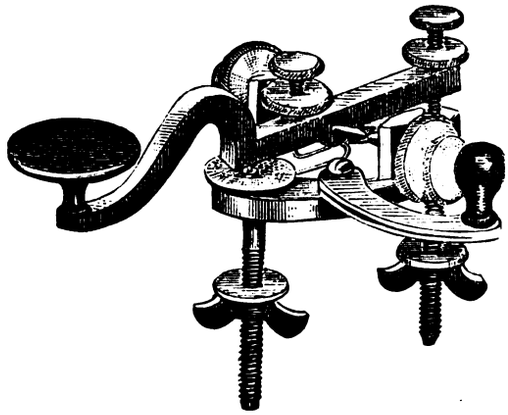
WATTS & COMPANY,

47 Holliday Street,
Baltimore, Md.,

SOLE MANUFACTURERS OF THE

PATENT CIRCUIT-CLOSER KEY,

Which has met with marked success.



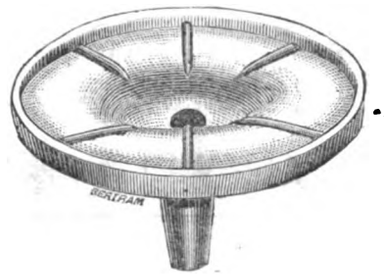
Price, $5 50 plain; $7 nickel-plated.

The following is from a competent judge, written after some weeks' trial.

145 BROADWAY, NEW YORK, Sept. 22d, 1873.

DEAR SIR,—Your circuit-closing attachment on the key, left with me for trial, is pronounced by all who have used it a decided and much-needed improvement on the common form.

Respectfully,
A. S. BROWN, *Manager.*



The Best Form of Battery Insulator Offered.

SIMPLE AND PERFECT.

Made of porcelain, handsome in appearance. Occupies little more space than the cell it supports. Each cell of battery completely isolated. Leakage is reduced to the minimum by the use of it.

General Superintendent Van Horn, Southern Division W. U. Tel. Co., writes of it:

"We have now in use a thousand or fifteen hundred of your battery insulators, and expect to order many more before the close of the year.

We have never used any battery insulator that equals it in any respect. In fact, it appears to be as near perfect as we can reasonably expect, in a contrivance for that purpose."

Price 40 cents

We offer a very excellent article of Galvanized Wire, superior to any in the market. The linemen on Baltimore and Ohio R. R. say they have never seen its equal for toughness and flexibility.

Special attention given to building.

Estimates given for any amount of material for telegraph construction or extension.

SWITCHES, GALVANOMETERS, RESISTANCE COILS, &c., to order.

Designs for Switch Boards for special service furnished.

SCOTT'S PATENT ANNUNCIATOR.

for Hotels and Residences.



Security Message Hook.

PATENT APPLIED FOR.

The damage from the loss of a single message will equip a line many times with our new Hook, which gives great security.

Price 30 cents each.

Price per dozen $3.00.

LIBERAL TERMS TO THE TRADE.

GEO. H. BLISS & CO.,
41 THIRD AVENUE, CHICAGO, ILL.,
GENERAL AGENTS.

WATTS & COMPANY,

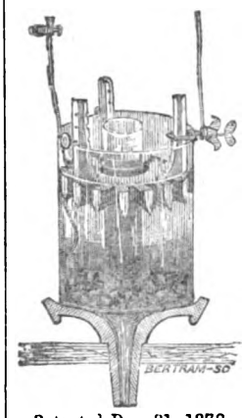
47 Holliday Street,
Baltimore, Md.,

MANUFACTURE

Telegraph and Electrical Instruments

OF EVERY DESCRIPTION.

Facilities for supplying any description of Machinery or Material equal to any in the United States.



Patented Dec 31, 1872.

Over SIX THOUSAND cells of the Baltimore Battery in use by the Gold and Stock Telegraph Company of New York in their Private Line Department, is a sufficient acknowledgement of its merit, as a form of the gravity battery, combining the valuable principles of

Economy, Cleanliness and Constancy,

"—in fact a base-burner."

F. L. POPE
Telegrapher, July 5th, '73.

SELF-FEEDING,

No Sulphate of Copper can reach the Sulphate of Zinc Solution.

The shape of Zinc and Copper, which, with the tube, were patented December 31st, 1872, secures the largest surface with least weight of the metals. Half pound sulphate copper per month, ample supply for No. 2, or 3.

Following is one of the many letters we have from reliable telegraphers:

PIEDMONT, W. Va., September 28th, 1873.

Messrs. WATTS & Co.,
Baltimore, Md.

GENTLEMEN:—On January 1st, 1873, I put up 75 cells of your No. 2, Baltimore Battery, in place of 40 cells of carbon, from which two railroad wires of 100 miles each, are supplied. It has not since been taken down or cleaned, and has required no attention, except to fill the tubes with blue stone, once each month, and replenish the fluid once or twice during this period, made necessary by evaporation.

I am fully convinced, from long experience, that this is superior to any other form of the gravity battery.

It has now been in constant use for nine months, and will not need new zinc until after January next.

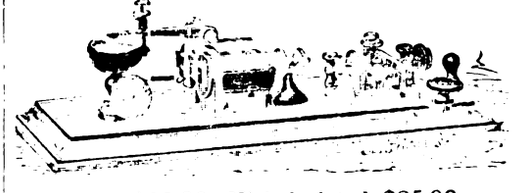
Respectfully,
J. G. NESBITT, *Manager.*

ORDERS FOR THIS BATTERY PROMPTLY FILLED.

A large stock constantly on hand.

No. 1 for Electro-motors, R. R. signals or similar service,	$2.25
No. 2 ordinary local or Printing Telegraph main	$1.75
No. 3 ordinary main	$1.25

A very Superior Main Line Sounder.



Brass, $22.50. Nickel-plated, $25.00.

For wrecking purposes or temporary offices, this instrument is without a rival.

A perfect combination, handsome, good-sounding instrument.

NO LOCAL REQUIRED.

Well seasoned black walnut box, large enough for pencils, paper, plyers and office wire, in addition to the instrument, $4.

Larger size for climbers, vises, &c., $5.

RELAYS, SOUNDERS AND KEYS,

always on hand, plain or plated.

Our Challange Sounder is the noisest instrument made.

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Tillotson's Programme

FOR THE HOLIDAYS.

Attention, Telegraphers!!

In order that we may be able to keep our men employed during the present hard times, we offer the following liberal inducements to purchasers of telegraph material until the

First of January, 1874.

To any person sending us an order for telegraph goods, however small, we will present a copy of Smith's Manual of Telegraphy, gratis.

For an order amounting to from five to ten dollars, we will present one year's subscription to the JOURNAL OF THE TELEGRAPH, or one copy Bond's Hand-book of Telegraph, (British).

For an order amounting to from twenty to thirty dollars, one year's subscription to the Telegrapher, a copy of Pope's Modern Practice of Electric Telegraph, or PRESCOTT'S HISTORY OF THE TELEGRAPH.

For an order amounting to from thirty to fifty dollars, one of either of the following instruments, viz: our Patent Excelsior Instruments for Students' use, our No. 1 or No. 2, Pony Sounder, or our No. 1 or No. 2 Key.

For an order amounting to one hundred dollars, our No. 1, or other style Relay of our manufacture.

For an order amounting to five hundred dollars, our Premium Spring Register.

For an order amounting to one thousand dollars, our Premium Spring Register with No. 1 Relay, Key, Lightning Arrester, and Cut Out, all nickle-plated and combined on marble base.

For an order amounting to ten thousand dollars, our magnificent Set of Sterling Silver Instruments, including Register, Relay and Key, and two Paper Rules, the whole worth $2,000.

Tillotson's Great Specialties.

Johnston's Celebrated Galvanized Line Wire, all sizes, sold at same prices as inferior wire of other manufacture.

The Kenosha Insulators, for which we are the sole Eastern Agents.

The Patent Canvel Screw Glass Insulator.

The New Patent Lockwood Battery.

The Famous Patent Leclanche Battery, for open circuits.

The well-known Patent Hill Battery.

The popular Callaud Battery.

The Patent Nitro-Chromic Battery, for heavy work.

The American Compound Patent Line Wire.

The Bishop Cables, Gutta Percha, Office and Magnet Wires, etc.

The Patent Excelsior Instrument for Amateurs and Students, acknowledged by all to excel any instrument ever designed for this purpose. Its price, its usefulness, its success,—all commend it. It is no toy, but is adapted for circuits of from one to ten miles in length, as well as a mere office circuit

The Patent Jones Lock Switch.

Rhumkorff Coils and Geissler Tubes, etc.

The Premium Spring Register.

The celebrated Relay Magnets, from their peculiar construction, continue to receive the encomiums from Telegraphers to which they are justly entitled.

Our Sounders, Keys and other Machinery are not excelled.

Carbon, Grove, Smee and other Batteries always in stock.

SEND FOR PRICE LIST.

L. G. TILLOTSON & CO.,

8 DEY STREET, NEW YORK.

F. L. POPE & CO.

Manufacturers and Dealers in

Telegraph Instruments and Supplies

OF EVERY DESCRIPTION,

38 Vesey Street, New York.

New and Superior patterns of

STANDARD TELEGRAPH INSTRUMENTS.

Their RELAYS, SOUNDERS, and KEYS which have been specially designed by Mr. F. L. Pope, are elegantly designed, thoroughly well finished and scientifically adapted to the service required and are recommended as SUPERIOR TO ANY HITHERTO OFFERED.

In addition to these ALL DESCRIPTIONS OF TELEGRAPH MATERIALS AND SUPPLIES are furnished, such as

INSULATORS, BATTERIES,
INSULATED WIRES,
CHEMICALS., ETC. ETC.

MAGNETIC AND DIAL INSTRUMENTS.

We have for sale also THE NONPAREIL TELEGRAPH INSTRUMENT for amateurs, learners and short lines.

A COMBINATION SET, comprising Sounder and Key on a handsome rosewood base.

Bradley's Box Relays and Sounders.

Bradley's Apparatus for Electrical Measurement.

Bradley's Naked Wire Helices and Magnet Spools to order, any desired size and resistance, at manufacturers' lowest price.

Descriptive Circular and Price Lists forwarded upon application to

F. L. POPE & CO.,

P. O. Box 6010 ***38 Vesey St., N. Y.***

LECLANCHÉ BATTERIES.

CAUTION.

All persons are hereby notified that Batteries

INFRINGING UPON OUR PATENT

are in the market (some of them nearly worthless). The Public are warned against using any such infringement, as in every case the guilty parties will be prosecuted to the fullest extent of the law. The GENUINE BATTERIES have the words "PILE LECLANCHÉ" on the Carbons and Glasses. Any information concerning such infringements will be thankfully received by the

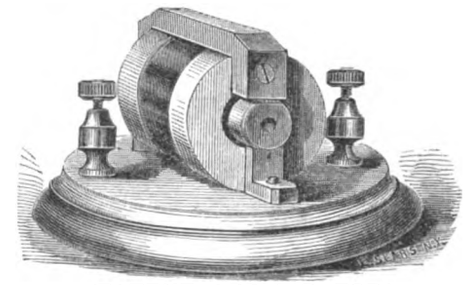
LECLANCHÉ BATTERY CO.,

No. 40 West 18th St.

NEW YORK, Oct. 11th, 1873.

SOMETHING NEW.

"The Rattler" Telegraph Sounder.



(PATENT APPLIED FOR.)

This is a very simple and effective Instrument, and, as it does not require any spring to draw the lever back, is always adjusted.

PRICE, - - - - $3.50.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N. Y.

TILLOTSON'S

MAIN LINE SOUNDERS

AND

BOX RELAYS,

NICKEL PLATED OR IN BRASS.

Illustrated on page 64 of our Catalogue.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N. Y.

TILLOTSON'S

NICKEL PLATED INSTRUMENTS.

We furnish all our machinery Nickel Plated at a small advance over the price of the same articles in Brass.

L. G. TILLOTSON & CO.,

No. 8 DEY STREET, N. Y.

PANIC PRICES.

Our profits having been ample, we offer our customers the benefit of the recent reduction in the cost of labor and material.

All who need Telegraph Instruments and Supplies, in large or small quantities, will consult their interests by purchasing from us.

SEND FOR OUR NEW PRICE LIST.

A special discount given on cash purchases.

GEO. H. BLISS & CO.,

41 THIRD AVENUE,

Chicago Ill.

IMPROVED AMATEUR SOUNDER.

An extra finished and good working Sounder,

No. 3, $4.00.

A well finished and good working Sounder,

No. 4, $3.00.

A well finished and good working Key,

No. 4 $4.00.

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